Geology Subject Index
Volume 18

absolute age *see also* geochronology; isotopes

absolute age—dates

alluvium: Channel trenching and climatic change in the Southern U.S. Great Plains; with Suppl. Data 90-09
(Hall, Stephen A.) 4: 342

bitumens: Pb-Pb dating of hydrocarbon migration into a bitumen-bearing ore deposit, North Wales
(Parnell, John, *et al.*) 10: 1028

carbonate rocks: Direct dating of stromatolitic carbonates from the Schmidtsdrif Formation (Transvaal Dolomite), South Africa, with implications on the age of the Ventersdorp Supergroup
(Jahn, Bor-ming, *et al.*) 12: 1211

carbonates: Across an early Holocene humid phase in western Sahara; pollen and isotope stratigraphy
(Lezine, Anne-Marie, *et al.*) 3: 264

colluvium: Late Holocene erosion and colluvium deposition in Swaziland
(Dardis, George F.) 10: 934

corals: Late Quaternary uplift of the Troodos Ophiolite, Cyprus; uranium-series dating of Pleistocene coral
(Poole, Andrew J., *et al.*) 9: 894

— Sea level and coral atolls; late Holocene emergence in the Indian Ocean
(Woodroffe, Colin, *et al.*) 1: 62

diorites: Rapid uplift and crustal growth in extensional environments; an isotopic study from the Death Valley region, California
(Asmerom, Yemane, *et al.*) 3: 223

foraminifers: High-latitude application of $^{87}Sr/^{86}Sr$; correlation of Nuwok beds on North Slope, Alaska, to standard Oligocene chronostratigraphy
(McNeil, David H., *et al.*) 5: 415

granites: Geochronologic and isotopic evidence for involvement of pre-Pan-African crust in the Nubian Shield, Egypt
(Sultan, Mohamed, *et al.*) 8: 761

— Tectonic significance of Silurian magmatism in the Canadian Appalachians
(Bevier, Mary Lou, *et al.*) 5: 411

illite: Mesozoic hydrothermal alteration associated with gold mineralization in the Mercur District, Utah
(Wilson, Paula N., *et al.*) 9: 866

K-feldspar: Episodic rapid uplift in the Himalaya revealed by $^{40}Ar/^{39}Ar$ analysis of detrital K-feldspar and muscovite, Bengal Fan
(Copeland, Peter, *et al.*) 4: 354

melts: Kara and Ust-Kara impact structures (USSR) and their relevance to the K/T boundary event
(Koeberl, Christian, *et al.*) 1: 50

metasedimentary rocks: Late Cretaceous extension in the hinterland of the Sevier thrust belt, northwestern Utah and southern Idaho; with Suppl. Data 90-20
(Wells, Michael L., *et al.*) 10: 929

mica group: $^{40}Ar/^{39}Ar$ laser-probe dating of detrital micas from the Montgomery Creek Formation, Northern California; clues to provenance, tectonics, and weathering processes
(Renne, Paul R., *et al.*) 6: 563

minerals: Dating Archean metamorphic minerals southeast of the Grenville Front, western Quebec, using Pb isotopes
(Gariepy, Clement, *et al.*) 11: 1078

muscovite: Late Cretaceous age of fractures in the Sierra Nevada Batholith, California
(Segall, Paul, *et al.*) 12: 1248

Paleosols: Stratigraphic evidence for late Quaternary dune activity near Hudson on the Piedmont of northern Colorado
(Forman, Steven L., *et al.*) 8: 745

rutile: Are the alteration halos of massive sulfide deposits syngenetic? Evidence from U-Pb dating of hydrothermal rutile at the Kidd volcanic center, Abitibi Subprovince, Canada
(Schandl, Eva Susan, *et al.*) 6: 505

sediments: Holocene history of the El Nino phenomenon as recorded in flood sediments of northern coastal Peru
(Wells, Lisa E.) 11: 1134

slates: Timing of middle Paleozoic (Acadian) metamorphism in the Southern Appalachians; K-Ar studies in the Talladega Belt, Alabama
(Kish, Stephen A.) 7: 650

zircon: Ancient continental margin assemblage in the northern Coast Mountains, Southeast Alaska and Northwest Canada
(Gehrels, George E., *et al.*) 3: 208

— Archean and Proterozoic ancestry in late Precambrian to early Paleozoic crustal elements of southern Turkey as revealed by single-zircon dating
(Kroner, A., *et al.*) 12: 1186

— Early Pan-African evolution of the basement around Elat, Israel, and the Sinai Peninsula revealed by single-zircon evaporation dating, and implications for crustal accretion rates
(Kroner, A., *et al.*) 6: 545

— Implications of new Jurassic stratigraphic, geochronometric, and paleolatitudinal data from the western Klamath Terrane (Smith River and Rogue Valley subterranes)
(Pessagno, Emile A., Jr., *et al.*) 7: 665

— Intra-arc strike-slip fault exposed at batholithic levels in the southern Sierra Nevada, California
(Busby-Spera, Cathy J., *et al.*) 3: 255

— Ion-microprobe dating of zircon from quartz-graphite veins at the Bristol, New Hampshire, metamorphic hot spot
(Zeitler, Peter K., *et al.*) 7: 626

— Kilbuck Terrane; oldest known rocks in Alaska
(Box, Stephen E., *et al.*) 12: 1219

— Petrogenetic and tectonic significance of xenocrystic Precambrian zircon in Lower Cambrian tonalite, eastern Klamath Mountains, California
(Wallin, E. T.) 11: 1057

— Timing and kinematics of deformation in the Cr[illegible]se Hills, California, and implications for Mesozoic structure of the southwestern Cordillera
(Walker, J. Douglas, *et al.*) 6: 554

— U-Pb and Sm-Nd ages for the Stillwater Complex and its associated sills and dikes, Beartooth Mountains, Montana; identification of a parent magma?; with Suppl. Data 90-26
(Premo, W. R., *et al.*) 11: 1065

— U/Pb zircon and baddeleyite ages for the Palisades and Gettysburg sills of the northeastern United States; implications for the age of the Triassic/Jurassic boundary
(Dunning, G. R., *et al.*) 8: 795

absolute age—interpretation

clastic rocks: Use and abuse of crustal accretion calculations; discussion
(Church, W. R.) 12: 1258

— Use and abuse of crustal accretion calculations; reply
(Pallister, John S., *et al.*) 12: 1259

marine sediments: Response of Th/U in deep Labrador Sea sediments (ODP Site 646) to changes in sedimentation rates and paleoproductivities
(Hillaire-Marcel, C., *et al.*) 2: 162

orogeny: Evolution of continental crust in the Central Andes; constraints from Nd isotope systematics; discussion
(Hsu, Kenneth J.) 5: 478

— Evolution of continental crust in the Central Andes; constraints from Nd isotope systematics; reply
(Harris, N. B. W.) 5: 478

periodicity: Search for periodicity in global events in the geologic record; quo vadimus?
(Baksi, Ajoy K.) 10: 983

suture zones: Orientation of late Precambrian sutures in the Arabian-Nubian shield
(Stern, Robert J., *et al.*) 11: 1103

terranes: Tectono-stratigraphic terranes in Cape Breton Island, Nova Scotia; implications for the configuration of the northern Appalachian Orogen; discussion
(Keppie, J. D.) 7: 669
— Tectono-stratigraphic terranes in Cape Breton Island, Nova Scotia; implications for the configuration of the northern Appalachian Orogen; reply
(Barr, Sandra M., *et al.*) 7: 670
thermal history: Constraints on friction and stress in the Taiwan fold-and-thrust belt from heat flow and geochronology
(Barr, Terence D., *et al.*) 2: 111
— Northern Monashee Mountains, Omineca crystalline belt, British Columbia; timing of metamorphism, anatexis, and tectonic denudation; with Suppl. Data 90-06
(Sevigny, J. H., *et al.*) 2: 103
tilt: Discordant paleomagnetic poles from the Canadian Coast Plutonic Complex; regional tilt rather than large-scale displacement? discussion
(Umhoefer, Paul J., *et al.*) 8: 800
— Discordant paleomagnetic poles from the Canadian Coast Plutonic Complex; regional tilt rather than large-scale displacement? reply
(Butler, R. F., *et al.*) 8: 801
uplifts: Geochronologic studies in central New England II; post-Acadian hinged and differential uplift; discussion
(Haugerud, Ralph A.) 2: 183
— Geochronologic studies in central New England II; post-Acadian hinged and differential uplift; reply
(Harrison, T. Mark, *et al.*) 2: 184

absolute age—techniques
sample preparation: $^{40}Ar/^{39}Ar$ laser-probe dating by step heating and spot fusion of phengites from the Dora Maira nappe of the Western Alps, Italy
(Scaillet, S., *et al.*) 8: 741

acoustical surveys *see under* geophysical surveys *under* Atlantic Ocean; Pacific Ocean

Africa *see also* Egypt; Kenya; Mauritania; Morocco; Namibia; Sahara; South Africa; Sudan; Swaziland; Tanzania; Tunisia

Africa—geophysical surveys
seismic surveys: Development of coarse-grained facies in lacustrine rift basins; examples from East Africa
(Scholz, Christopher A., *et al.*) 2: 140

Africa—structural geology
tectonics: Orientation of late Precambrian sutures in the Arabian-Nubian shield
(Stern, Robert J., *et al.*) 11: 1103

Alabama—geochronology
Devonian: Timing of middle Paleozoic (Acadian) metamorphism in the Southern Appalachians; K-Ar studies in the Talladega Belt, Alabama
(Kish, Stephen A.) 7: 650

Alabama—stratigraphy
Cretaceous: Upper Cretaceous marl-limestone sequences of Alabama; possible products of sea-level change, not climate forcing
(King, David T., Jr.) 1: 19

Alaska—geochronology
absolute age: Ancient continental margin assemblage in the northern Coast Mountains, Southeast Alaska and Northwest Canada
(Gehrels, George E., *et al.*) 3: 208
Oligocene: High-latitude application of $^{87}Sr/^{86}Sr$; correlation of Nuwok beds on North Slope, Alaska, to standard Oligocene chronostratigraphy
(McNeil, David H., *et al.*) 5: 415
Pleistocene: A 3 m.y. record of Pliocene-Pleistocene loess in interior Alaska
(Westgate, John A., *et al.*) 9: 858
Pliocene: A 3 m.y. record of Pliocene-Pleistocene loess in interior Alaska
(Westgate, John A., *et al.*) 9: 858
Proterozoic: Kilbuck Terrane; oldest known rocks in Alaska
(Box, Stephen E., *et al.*) 12: 1219

Alaska—oceanography
sedimentation: Tidal drawdown; a mechanism for producing cyclic sediment laminations in glaciomarine deltas
(Smith, Norman D., *et al.*) 1: 10

Alaska—petrology
magmas: Intra-arc extension and magmatic evolution in the central Aleutian arc, Alaska
(Singer, Bradley S., *et al.*) 11: 1050

Alaska—stratigraphy
Quaternary: Paleoclimatic forcing of magnetic susceptibility variations in Alaskan loess during the late Quaternary
(Beget, James E., *et al.*) 1: 40

Alaska—structural geology
tectonics: Cenozoic thrust emplacement of a Devonian batholith, northeastern Brooks Range; involvement of crystalline rocks in a foreland fold-and-thrust belt
(Hanks, Catherine L., *et al.*) 5: 395
— Yukon-Tanana Terrane; a partial acquittal
(Hansen, Vicki L.) 4: 365

Alaska—tectonophysics
crust: Seismic anisotropy due to preferred mineral orientation observed in shallow crustal rocks in southern Alaska
(Brocher, Thomas M., *et al.*) 8: 737

Alaska—volcanology
Novarupta: New structural limits on magma chamber locations at the Valley of Ten Thousand Smokes, Katmai National Park, Alaska
(Wallmann, Peter C., *et al.*) 12: 1240

Alberta—stratigraphy
Cambrian: Stratigraphic significance of Cruziana; new data concerning the Cambrian-Ordovician ichnostratigraphic paradigm
(Magwood, James P. A., *et al.*) 8: 729

algal flora—biostratigraphy
Devonian: Magnetostratigraphy, Late Devonian iridium anomaly, and impact hypotheses
(Hurley, Neil F., *et al.*) 4: 291

algal flora—ecology
lacustrine environment: Cyanobacterial precipitation of gypsum, calcite, and magnesite from natural alkaline lake water
(Thompson, J. B., *et al.*) 10: 995

algal flora—nannofossils
Pliocene: High eustatic sea level during the middle Pliocene; evidence from the Southeastern U.S. Atlantic Coastal Plain; with Suppl. Data 90-13
(Dowsett, Harry J., *et al.*) 5: 435

algal flora—paleoecology
Holocene: Stable-isotope record of organic carbon from an evolving carbonate banktop, Bight of Abaco, Bahamas
(Rasmussen, Kenneth A., *et al.*) 8: 790

algal flora—stromatolites
Holocene: Across an early Holocene humid phase in western Sahara; pollen and isotope stratigraphy
(Lezine, Anne-Marie, *et al.*) 3: 264

alluvium *see under* clastic sediments *under* sediments

Alps *see also* the individual countries

Alps—geochronology
absolute age: $^{40}Ar/^{39}Ar$ laser-probe dating by step heating and spot fusion of phengites from the Dora Maira nappe of the Western Alps, Italy
(Scaillet, S., *et al.*) 8: 741

Alps—geophysical surveys
surveys: Lithospheric wedging in the Western Alps inferred from the ECORS-CROP traverse
(Nicolas, A., *et al.*) 7: 587

Alps—petrology
intrusions: I-type granitoids as indicators of a late Paleozoic convergent ocean-continent margin along the southern flank of the central European Variscan Orogen
(Finger, F., *et al.*) 12: 1207
metamorphic rocks: Alpine Jurassic ophiolites resemble the modern central Atlantic basement
(Lagabrielle, Yves, *et al.*) 4: 319

Alps—sedimentary petrology
diagenesis: Hydrothermal dolomitization of Jurassic-Cretaceous limestones in the Southern Alps (Italy); relation to tectonics and volcanism
(Cervato, Cinzia) 5: 458

Alps—stratigraphy
Mesozoic: Mesozoic paleogeography of the northern Calcareous Alps; evidence from paleomagnetism and facies analysis
(Channell, J. E. T., *et al.*) 9: 828
Triassic: Metamorphosed weathering horizon from the Oetztal-Stubai crystalline complex (Eastern Alps, Austria)
(Krois, Peter, *et al.*) 11: 1095

Alps—structural geology
neotectonics: Neogene extensional collapse in the western Mediterranean (Betic-Rif Alpine orogenic belt); implications for the genesis of the Gibraltar Arc and magmatic activity; discussion
(Frizon de Lamotte, Dominique, *et al.*) 4: 381
— Neogene extensional collapse in the western Mediterranean (Betic-Rif Alpine orogenic belt); implications for the genesis of the Gibraltar Arc and magmatic activity; reply
(Doblas, Miguel, *et al.*) 4: 381

Alps—tectonophysics
crust: Extension in compressional orogenic belts; the Eastern Alps; discussion
(Behrmann, J. H.) 7: 673
— Extension in compressional orogenic belts; the Eastern Alps; discussion
(Wallis, S. R.) 7: 675
— Extension in compressional orogenic belts; the Eastern Alps; reply
(Ratschbacher, L., *et al.*) 7: 673
— Extension in compressional orogenic belts; the Eastern Alps; reply
(Ratschbacher, L., *et al.*) 7: 675
— Lithospheric wedging in the Western Alps inferred from the ECORS-CROP traverse
(Nicolas, A., *et al.*) 7: 587

aluminum—geochemistry
clinopyroxene: Discrimination of ophiolitic from nonophiolitic ultramafic-mafic allochthons in orogenic belts by the Al/Ti ratio in clinopyroxene
(Loucks, Robert R.) 4: 346

Andes *see also* the individual countries

Andes—geochemistry
trace elements: Modified Gulf of California model for South Georgia, North Scotia Ridge, and implications for the Rocas Verdes back-arc basin, Southern Andes
(Alabaster, T., *et al.*) 6: 497

Andes—tectonophysics
crust: Evolution of continental crust in the Central Andes; constraints from Nd isotope systematics; discussion
(Hsu, Kenneth J.) 5: 478
— Evolution of continental crust in the Central Andes; constraints from Nd isotope systematics; reply
(Harris, N. B. W.) 5: 478
— Lower bound on the amount of crustal shortening in the central Bolivian Andes
(Sheffels, Barbara Moths) 9: 812

Antarctica—geochemistry
trace elements: Modified Gulf of California model for South Georgia, North Scotia Ridge, and implications for the Rocas Verdes back-arc basin, Southern Andes
(Alabaster, T., *et al.*) 6: 497

Antarctica—stratigraphy
Cretaceous: High-paleolatitude Late Cretaceous paleotemperatures; new data from James Ross Island, Antarctica
(Pirrie, D., *et al.*) 1: 31

Apennines—petrology
metamorphic rocks: Alpine Jurassic ophiolites resemble the modern central Atlantic basement
(Lagabrielle, Yves, *et al.*) 4: 319

Apennines—structural geology
deformation: Channelized fluid flow through shear zones during fluid-enhanced dynamic recrystallization, Northern Apennines, Italy
(Carter, Karen E., *et al.*) 8: 720
tectonics: Pattern of extensional faulting in pelagic carbonates of the Umbria-Marche Apennines of central Italy
(Alvarez, Walter) 5: 407

Appalachians *see also* the individual states and provinces

Appalachians—economic geology
lead-zinc deposits: Timing of mississippi valley-type mineralization; relation to Appalachian orogenic events
(Kesler, Stephen E., *et al.*) 11: 1115
metal ores: Timing of mississippi valley-type mineralization; relation to Appalachian orogenic events
(Kesler, Stephen E., *et al.*) 11: 1115

Appalachians—geochronology
Devonian: Timing of middle Paleozoic (Acadian) metamorphism in the Southern Appalachians; K-Ar studies in the Talladega Belt, Alabama
(Kish, Stephen A.) 7: 650

Appalachians—geomorphology
fluvial features: Fluvial response to debris associated with mass wasting during extreme floods
(Miller, Andrew J.) 7: 599
solution features: Glaciation and saline-freshwater mixing as a possible cause of cave formation in the eastern Midcontinent region of the United States; a conceptual model
(Panno, Samuel V., *et al.*) 8: 769

Appalachians—stratigraphy
Paleozoic: Nested Paleozoic "successor" basins in the southern Appalachian Blue Ridge
(Tull, James F., *et al.*) 11: 1046
Pennsylvanian: Paleoclimate controls on stratigraphic repetition of chemical and siliciclastic rocks
(Cecil, C. Blaine) 6: 533

Appalachians—structural geology
orogeny: Tectono-stratigraphic terranes in Cape Breton Island, Nova Scotia; implications for the configuration of the northern Appalachian Orogen; discussion
(Keppie, J. D.) 7: 669
— Tectono-stratigraphic terranes in Cape Breton Island, Nova Scotia; implications for the configuration of the northern Appalachian Orogen; reply
(Barr, Sandra M., *et al.*) 7: 670
structural analysis: Structure of the Appalachian deformation front in western Newfoundland; implications of multichannel seismic reflection data
(Stockmal, Glen S., *et al.*) 8: 765
tectonics: Constraints on Alleghanian vertical displacements in the southern Appalachian Piedmont, based on aluminum-in-hornblende barometry
(Vyhnal, Christopher R., *et al.*) 10: 938
— Delamination in collisional orogens
(Sacks, Paul E., *et al.*) 10: 999
— Early history of the Michigan Basin; subsidence and Appalachian tectonics
(Howell, Paul D., *et al.*) 12: 1195
— Late Precambrian crustal extension preserved in Fries fault zone mylonites, Southern Appalachians; discussion
(Eckert, James O., Jr.) 4: 379
— Late Precambrian crustal extension preserved in Fries fault zone mylonites, Southern Appalachians; reply
(Simpson, Carol, *et al.*) 4: 380
— Nested Paleozoic "successor" basins in the southern Appalachian Blue Ridge
(Tull, James F., *et al.*) 11: 1046
— Tectonic significance of Silurian magmatism in the Canadian Appalachians
(Bevier, Mary Lou, *et al.*) 5: 411
— Timing of mississippi valley-type mineralization; relation to Appalachian orogenic events
(Kesler, Stephen E., *et al.*) 11: 1115

Appalachians—tectonophysics
crust: Gulf Coast-East Coast magnetic anomaly; I, Root of the main crustal decollement for the Appalachian-Ouachita Orogen
(Hall, David J.) 9: 862
plate tectonics: Early Paleozoic paleogeography and accretionary history of the Newfoundland Appalachians
(van der Pluijm, Ben A., *et al.*) 9: 898
— Post-Taconic blueschist suture in the Northern Appalachians of northern New Brunswick, Canada
(van Staal, Cees R., *et al.*) 11: 1073
Arabian Gulf *see* Persian Gulf
Arabian Peninsula *see also* United Arab Emirates
Arabian Peninsula—structural geology
tectonics: Orientation of late Precambrian sutures in the Arabian-Nubian shield
(Stern, Robert J., *et al.*) 11: 1103
Arabian Peninsula—tectonophysics
crust: Use and abuse of crustal accretion calculations
(Pallister, John S., *et al.*) 1: 35
— Use and abuse of crustal accretion calculations; discussion
(Church, W. R.) 12: 1258
— Use and abuse of crustal accretion calculations; reply
(Pallister, John S., *et al.*) 12: 1259
Archean *see also* Precambrian; *see also under* geochronology *under* Canadian Shield; Montana; Quebec; South Africa
Arctic region *see also* the individual countries; Greenland; Spitsbergen
Argentina—geophysical surveys
remote sensing: Lithologic mixing in a modern foreland basin; evidence from Landsat thematic mapper images
(Damanti, John F.) 9: 835
argon—geochemistry
ground water: Noble gas and methane partitioning from ground water; an aid to natural gas exploration and reservoir evaluation
(Zaikowski, Anthony, *et al.*) 1: 72
arid regions *see* deserts *under* eolian features *under* geomorphology
Arizona—geochemistry
trace elements: Mantle sources in the Arizona transition zone and global mantle heterogeneity
(Cooper, Jeanne L., *et al.*) 11: 1146
Arizona—structural geology
folds: Folding of mylonitic zones in Cordilleran metamorphic core complexes; evidence from near the mylonitic front
(Reynolds, Stephen J., *et al.*) 3: 216
tectonics: Regional significance of recurrent faulting and intracanyon volcanism at Oak Creek canyon, southern Colorado Plateau, Arizona; with Suppl. Data 90-23
(Holm, Richard F., *et al.*) 10: 1014
Arkansas—structural geology
folds: Evolution of antivergent folds on a Paleozoic accretionary prism, Arkansas; an alternative view
(Babaei, Abdolali) 10: 987
arthropods—crustaceans
Tertiary: Doomed pioneers; gravity-flow deposition and bioturbation in marine oxygen-deficient environments
(Follmi, Karl B., *et al.*) 11: 1069
Asia *see also* Arabian Peninsula; Burma; China; Himalayas; India; Indonesia; Japan; Malaysia; Philippine Islands; Taiwan
Asia—stratigraphy
Proterozoic: Proterozoic supercontinent, its latest Precambrian rifting, breakup, dispersal into small continents, and subsidence of their margins; evidence from Asia
(Ilyin, A. V.) 12: 1231
Asia—tectonophysics
plate tectonics: Paleontological view of the ages of the Deccan Traps, the Cretaceous/Tertiary boundary, and the India-Asia collision; discussion
(Thewissen, J. G. M.) 2: 185
— Paleontological view of the ages of the Deccan Traps, the Cretaceous/Tertiary boundary, and the India-Asia collision; discussion
(Buffetaut, Eric) 2: 186
— Paleontological view of the ages of the Deccan Traps, the Cretaceous/Tertiary boundary, and the India-Asia collision; reply
(Jaeger, J. J., *et al.*) 2: 186
— Proterozoic supercontinent, its latest Precambrian rifting, breakup, dispersal into small continents, and subsidence of their margins; evidence from Asia
(Ilyin, A. V.) 12: 1231
Atlantic Coastal Plain—geochemistry
iron: Fe(III)-reducing bacteria in deeply buried sediments of the Atlantic Coastal Plain
(Lovley, Derek R., *et al.*) 10: 954
Atlantic Coastal Plain—stratigraphy
changes of level: High eustatic sea level during the middle Pliocene; evidence from the Southeastern U.S. Atlantic Coastal Plain; with Suppl. Data 90-13
(Dowsett, Harry J., *et al.*) 5: 435
Atlantic Ocean *see also* North Sea
Atlantic Ocean—geochemistry
isotopes: Response of Th/U in deep Labrador Sea sediments (ODP Site 646) to changes in sedimentation rates and paleoproductivities
(Hillaire-Marcel, C., *et al.*) 2: 162
magmas: Modified Gulf of California model for South Georgia, North Scotia Ridge, and implications for the Rocas Verdes back-arc basin, Southern Andes
(Alabaster, T., *et al.*) 6: 497
Atlantic Ocean—geophysical surveys
acoustical surveys: North Atlantic fracture-zone distribution and patterns shown by multibeam sonar; discussion
(Tucholke, Brian E.) 9: 911
— North Atlantic fracture-zone distribution and patterns shown by multibeam sonar; reply
(Smoot, N. Christian) 9: 912
magnetotelluric surveys: Structure of the Atlantic margin of Mauritania (western Africa) based on geoelectrical and drilling data
(Ritz, Michel, *et al.*) 6: 571
seismic surveys: Accumulation of bank-top sediment on the western slope of Great Bahama Bank; rapid progradation of a carbonate megabank
(Wilber, R. Jude, *et al.*) 10: 970
— Crustal structure of the Southeast Georgia Embayment-Carolina Trough; preliminary results of a composite seismic image of a continental suture(?) and a volcanic passive margin
(Austin, James A., Jr., *et al.*) 10: 1023
— New seismic images of oceanic crustal structure
(White, Robert S., *et al.*) 5: 462
— Reflections from mantle fault zones around the British Isles
(Flack, Catherine A., *et al.*) 6: 528
— Structure of the Appalachian deformation front in western Newfoundland; implications of multichannel seismic reflection data
(Stockmal, Glen S., *et al.*) 8: 765
surveys: Detailed structure and possible fluid paths at the toe of the Barbados accretionary wedge (ODP Leg 110 area)
(Lallemant, Siegfried J. C., *et al.*) 9: 854
Atlantic Ocean—oceanography
ocean circulation: Active circulation of saline ground waters in carbonate platforms; evidence from the Great Bahama Bank
(Whitaker, F. F., *et al.*) 3: 200
ocean floors: North Atlantic fracture-zone distribution and patterns shown by multibeam sonar; discussion
(Tucholke, Brian E.) 9: 911
— North Atlantic fracture-zone distribution and patterns shown by multibeam sonar; reply
(Smoot, N. Christian) 9: 912
— Scalloped bank margins; beginning of the end for carbonate platforms?; discussion
(Ball, Mahlon M.) 1: 95
— Scalloped bank margins; beginning of the end for carbonate platforms?; reply
(Mullins, Henry T., *et al.*) 1: 95
sediments: Early Cretaceous shelf-edge deltas of the Baltimore Canyon Trough; principal sources for sediment gravity deposits of the northern

Hatteras Basin
(Poag, C. Wylie, *et al.*) 2: 149

Atlantic Ocean—stratigraphy
Cretaceous: Brief reversed polarity interval during the Cretaceous normal polarity superchron
(Tarduno, John A.) 8: 683

Atlantic Ocean—tectonophysics
crust: Alpine Jurassic ophiolites resemble the modern central Atlantic basement
(Lagabrielle, Yves, *et al.*) 4: 319
— Crustal structure of the Southeast Georgia Embayment-Carolina Trough; preliminary results of a composite seismic image of a continental suture(?) and a volcanic passive margin
(Austin, James A., Jr., *et al.*) 10: 1023
— New seismic images of oceanic crustal structure
(White, Robert S., *et al.*) 5: 462
— North Atlantic fracture-zone distribution and patterns shown by multibeam sonar; discussion
(Tucholke, Brian E.) 9: 911
— North Atlantic fracture-zone distribution and patterns shown by multibeam sonar; reply
(Smoot, N. Christian) 9: 912
— Structure of the Atlantic margin of Mauritania (western Africa) based on geoelectrical and drilling data
(Ritz, Michel, *et al.*) 6: 571
mantle: Reflections from mantle fault zones around the British Isles
(Flack, Catherine A., *et al.*) 6: 528

Atlantic region *see also* the individual countries

Atlantic region—geochemistry
isotopes: Oxygen isotope geochemistry of the silicic volcanic rocks of the Etendeka-Parana Province; source constraints
(Harris, Chris, *et al.*) 11: 1119

atmosphere—evolution
paleoatmosphere: Temporal variations in tempestite thickness may be a geologic record of atmospheric CO_2; discussion
(Woods, Arnold) 9: 910
— Temporal variations in tempestite thickness may be a geologic record of atmospheric CO_2; reply
(Brandt, Danita S., *et al.*) 9: 911

atolls *see* reefs *under* diagenesis *under* sedimentation; *see* reefs *under* oceanography *under* Indian Ocean; Pacific Ocean

Australasia *see also* New Zealand; Papua New Guinea

Australia *see also* Queensland; South Australia; Victoria; Western Australia

Australia—oceanography
continental margin: Two-stage Early Cretaceous rifting of the Otway Basin margin of southeastern Australia; implications for rifting of the Australian southern margin
(Williamson, P. E., *et al.*) 1: 75

Australia—tectonophysics
plate tectonics: Precambrian tectonic evolution of part of Gondwana, southwestern Australia
(Myers, John S.) 6: 537

Austria—petrology
metamorphic rocks: Metamorphosed weathering horizon from the Oetztal-Stubai crystalline complex (Eastern Alps, Austria)
(Krois, Peter, *et al.*) 11: 1095

Austria—stratigraphy
Mesozoic: Mesozoic paleogeography of the northern Calcareous Alps; evidence from paleomagnetism and facies analysis
(Channell, J. E. T., *et al.*) 9: 828

Austria—structural geology
tectonics: Extension in compressional orogenic belts; the Eastern Alps; discussion
(Behrmann, J. H.) 7: 673
— Extension in compressional orogenic belts; the Eastern Alps; discussion
(Wallis, S. R.) 7: 675
— Extension in compressional orogenic belts; the Eastern Alps; reply
(Ratschbacher, L., *et al.*) 7: 673
— Extension in compressional orogenic belts; the Eastern Alps; reply
(Ratschbacher, L., *et al.*) 7: 675

automatic data processing *see* data processing

Bahamas—geochemistry
diagenesis: New distribution coefficient for the incorporation of strontium into dolomite and its implications for the formation of ancient dolomites
(Vahrenkamp, Volker C., *et al.*) 5: 387

Bahamas—hydrogeology
ground water: Active circulation of saline ground waters in carbonate platforms; evidence from the Great Bahama Bank
(Whitaker, F. F., *et al.*) 3: 200

Bahamas—oceanography
ocean floors: Scalloped bank margins; beginning of the end for carbonate platforms?; discussion
(Ball, Mahlon M.) 1: 95
— Scalloped bank margins; beginning of the end for carbonate platforms?; reply
(Mullins, Henry T., *et al.*) 1: 95

Bahamas—stratigraphy
changes of level: Accumulation of bank-top sediment on the western slope of Great Bahama Bank; rapid progradation of a carbonate megabank
(Wilber, R. Jude, *et al.*) 10: 970
— Stable-isotope record of organic carbon from an evolving carbonate banktop, Bight of Abaco, Bahamas
(Rasmussen, Kenneth A., *et al.*) 8: 790
Holocene: Magnesium-salinity relation in the saline lake ostracode Cyprideis americana
(Teeter, James W., *et al.*) 3: 220

Baltic region *see also* the individual countries

Barbados—tectonophysics
plate tectonics: Detailed structure and possible fluid paths at the toe of the Barbados accretionary wedge (ODP Leg 110 area)
(Lallemant, Siegfried J. C., *et al.*) 9: 854

basalts *see under* igneous rocks

base metals *see also under* economic geology *under* Ontario

Basin and Range Province—geochemistry
mantle: Mantle sources in the Arizona transition zone and global mantle heterogeneity
(Cooper, Jeanne L., *et al.*) 11: 1146

Basin and Range Province—structural geology
neotectonics: Extension of the Yellowstone Plateau, eastern Snake River plain, and Owyhee Plateau; with Suppl. Data 90-28
(Rodgers, David W., *et al.*) 11: 1138
— Northeastern Basin and Range Province active tectonics; an alternative view; discussion
(Anders, Mark H., *et al.*) 9: 914
— Northeastern Basin and Range Province active tectonics; an alternative view; reply
(Westaway, Rob) 9: 915

batholiths *see under* intrusions

biogeography—vertebrates
Cretaceous: Paleontological view of the ages of the Deccan Traps, the Cretaceous/Tertiary boundary, and the India-Asia collision; discussion
(Thewissen, J. G. M.) 2: 185
— Paleontological view of the ages of the Deccan Traps, the Cretaceous/Tertiary boundary, and the India-Asia collision; discussion
(Buffetaut, Eric) 2: 186
— Paleontological view of the ages of the Deccan Traps, the Cretaceous/Tertiary boundary, and the India-Asia collision; reply
(Jaeger, J. J., *et al.*) 2: 186

biography—general
Chamberlin, T. C.: Method of multiple working hypotheses; a chimera
(Johnson, J. G.) 1: 44
— Method of multiple working hypotheses; a chimera; discussion
(Railsback, L. Bruce) 9: 917
— Method of multiple working hypotheses; a chimera; discussion
(Locke, William W.) 9: 918

— Method of multiple working hypotheses; a chimera; reply
(Johnson, J. G.) 9: 918
Jeffreys, Harold: The world turned inside out
(Nisbet, E. G.) 1: 4

Bolivia—structural geology
tectonics: Late Oligocene-early Miocene major tectonic crisis and related basins in Bolivia
(Sempere, Thierry, *et al.*) 10: 946

Bolivia—tectonophysics
crust: Lower bound on the amount of crustal shortening in the central Bolivian Andes
(Sheffels, Barbara Moths) 9: 812

Brazil—geochemistry
isotopes: Oxygen isotope geochemistry of the silicic volcanic rocks of the Etendeka-Parana Province; source constraints
(Harris, Chris, *et al.*) 11: 1119
trace elements: Mantle plumes and flood-basalt stratigraphy in the Parana, South America
(Peate, David W., *et al.*) 12: 1223

breccia *see under* xenoliths *under* inclusions

brines *see also* bromine

British Columbia—geochronology
Cretaceous: Northern Monashee Mountains, Omineca crystalline belt, British Columbia; timing of metamorphism, anatexis, and tectonic denudation; with Suppl. Data 90-06
(Sevigny, J. H., *et al.*) 2: 103

British Columbia—geophysical surveys
seismic surveys: Deep, high-amplitude reflections from a major shear zone above the subducting Juan de Fuca Plate
(Calvert, A. J., *et al.*) 11: 1091
— Thick and fast; sedimentation in a Pleistocene fiord lake of British Columbia, Canada
(Eyles, Nicholas, *et al.*) 11: 1153

British Columbia—petrology
metamorphism: Apparent isobaric cooling paths from granulites; two counterexamples from British Columbia and New Hampshire
(Selverstone, Jane, *et al.*) 4: 307

British Columbia—stratigraphy
Pleistocene: Thick and fast; sedimentation in a Pleistocene fiord lake of British Columbia, Canada
(Eyles, Nicholas, *et al.*) 11: 1153

British Columbia—structural geology
faults: Extensional duplex in the Purcell Mountains of southeastern British Columbia
(Root, Kevin G.) 5: 419
tectonics: Discordant paleomagnetic poles from the Canadian Coast Plutonic Complex; regional tilt rather than large-scale displacement? discussion
(Umhoefer, Paul J., *et al.*) 8: 800
— Discordant paleomagnetic poles from the Canadian Coast Plutonic Complex; regional tilt rather than large-scale displacement? reply
(Butler, R. F., *et al.*) 8: 801
— Discordant paleomagnetic poles from the Canadian Coast Plutonic Complex; regional tilt rather than large displacement? discussion
(Miller, Robert B., *et al.*) 11: 1164
— Discordant paleomagnetic poles from the Canadian Coast Plutonic Complex; regional tilt rather than large displacement? reply
(Butler, R. F., *et al.*) 11: 1165
— Pebbles from Barkerville and Slide Mountain terranes in a Quesnel Terrane conglomerate; evidence for pre-Jurassic deformation of the Barkerville and Slide Mountain terranes
(McMullin, David W. A., *et al.*) 10: 962

bromine—geochemistry
brines: Origin of the oil-field brines in the Paris Basin
(Matray, Jean-Michel, *et al.*) 6: 501
connate waters: Br-Cl-Na systematics in Illinois Basin fluids; constraints on fluid origin and evolution
(Walter, Lynn M., *et al.*) 4: 315

Bulgaria—structural geology
tectonics: Implications of shear-sense criteria for the tectonic evolution of the central Rhodope Massif, southern Bulgaria
(Burg, Jean-Pierre, *et al.*) 5: 451

Burma—tectonophysics
plate tectonics: Nature of ophiolite occurrences along the eastern margin of the Indian Plate and their tectonic significance
(Sengupta, S., *et al.*) 5: 439

burrows *see* ichnofossils

calcite *see also under* carbonates *under* minerals

calcium—geochemistry
shale: Sodium-calcium ion exchange in the weathering of shales; implications for global weathering budgets; discussion
(Berner, Robert A., *et al.*) 2: 190
— Sodium-calcium ion exchange in the weathering of shales; implications for global weathering budgets; reply
(Cerling, Thure E., *et al.*) 2: 190

California—geochemistry
crust: Rapid uplift and crustal growth in extensional environments; an isotopic study from the Death Valley region, California
(Asmerom, Yemane, *et al.*) 3: 223
isotopes: Sulfur isotopic ratios of the magnetite-series and ilmenite-series granitoids of the Sierra Nevada Batholith; a reconnaissance study; discussion
(Zheng, Y. F.) 7: 671
— Sulfur isotopic ratios of the magnetite-series and ilmenite-series granitoids of the Sierra Nevada Batholith; a reconnaissance study; reply
(Ishihara, Shunso, *et al.*) 7: 672
trace elements: Rare earth elements as indicators of different marine depositional environments in chert and shale
(Murray, Richard W., *et al.*) 3: 268

California—geochronology
absolute age: Petrogenetic and tectonic significance of xenocrystic Precambrian zircon in Lower Cambrian tonalite, eastern Klamath Mountains, California
(Wallin, E. T.) 11: 1057
Cretaceous: Late Cretaceous age of fractures in the Sierra Nevada Batholith, California
(Segall, Paul, *et al.*) 12: 1248
Eocene: $^{40}Ar/^{39}Ar$ laser-probe dating of detrital micas from the Montgomery Creek Formation, Northern California; clues to provenance, tectonics, and weathering processes
(Renne, Paul R., *et al.*) 6: 563

California—geomorphology
landform description: Debris-flow benches; dune-contact deposits record paleo-sand dune positions in North Panamint Valley, Inyo County, California
(Anderson, Suzanne Prestrud, *et al.*) 6: 524
volcanic features: Geomorphic assessment of late Quaternary volcanism in the Yucca Mountain area, southern Nevada; implications for the proposed high-level radioactive waste repository
(Wells, S. G., *et al.*) 6: 549

California—mineralogy
framework silicates, plagioclase: Cathodoluminescence microscopy of myrmekite
(Hopson, R. Forrest, *et al.*) 4: 336
— Cathodoluminescence microscopy of myrmekite; discussion
(Collins, Lorence G.) 11: 1163
— Cathodoluminescence microscopy of myrmekite; reply
(Hopson, R. Forrest, *et al.*) 11: 1163

California—stratigraphy
Jurassic: Implications of new Jurassic stratigraphic, geochronometric, and paleolatitudinal data from the western Klamath Terrane (Smith River and Rogue Valley subterranes)
(Pessagno, Emile A., Jr., *et al.*) 7: 665
Miocene: Doomed pioneers; gravity-flow deposition and bioturbation in marine oxygen-deficient environments
(Follmi, Karl B., *et al.*) 11: 1069

California—structural geology
faults: Intra-arc strike-slip fault exposed at batholithic levels in the southern Sierra Nevada, California
(Busby-Spera, Cathy J., *et al.*) 3: 255
neotectonics: Black Mountains crustal section, Death Valley extended terrain, California
(Holm, Daniel K., *et al.*) 6: 520
— Transverse Ranges and neotectonics of Southern California
(Hill, Mason L.) 1: 23
tectonics: Timing and kinematics of deformation in the Cronese Hills, California, and implications for Mesozoic structure of the southwestern Cordillera
(Walker, J. Douglas, *et al.*) 6: 554

California—tectonophysics
crust: Black Mountains crustal section, Death Valley extended terrain, California
(Holm, Daniel K., *et al.*) 6: 520

Cambrian *see also under* geochronology *under* Turkey; *see also under* stratigraphy *under* Alberta

Canada *see also* Alberta; Appalachians; Atlantic Coastal Plain; British Columbia; Canadian Shield; Great Lakes; Great Lakes region; Great Plains; New Brunswick; Newfoundland; Northwest Territories; Nova Scotia; Ontario; Prince Edward Island; Quebec; Saskatchewan; Yukon Territory

Canadian Shield—geochemistry
isotopes: Did major changes in the stable-isotope composition of Proterozoic seawater occur?
(Burdett, J. W., *et al.*) 3: 227

Canadian Shield—geochronology
Archean: Are the alteration halos of massive sulfide deposits syngenetic? Evidence from U-Pb dating of hydrothermal rutile at the Kidd volcanic center, Abitibi Subprovince, Canada
(Schandl, Eva Susan, *et al.*) 6: 505

Canadian Shield—petrology
metamorphism: Growth and retrograde zoning in garnets from high-grade metapelites; implications for pressure-temperature paths
(Tuccillo, M. E., *et al.*) 9: 839
— Implications of post-thrusting extension and underplating for P-T-t paths in granulite terranes; a Grenville example
(Anovitz, L. M., *et al.*) 5: 466

Canadian Shield—structural geology
tectonics: Middle Proterozoic piggyback basin in the subsurface of northwestern Canada
(Cook, Frederick A., *et al.*) 7: 662
— Proterozoic subduction and terrane amalgamation in the southwestern Grenville Province, Canada; evidence from ultrapotassic to shoshonitic plutonism
(Corriveau, Louise) 7: 614

Canadian Shield—tectonophysics
crust: Geobarometry, differential block movements, and crustal structure of the southwestern Abitibi greenstone belt, Canada
(Feng, Rui, *et al.*) 9: 870
— Major circular structure beneath southern Lake Huron defined from potential field data
(Forsyth, D. A., *et al.*) 8: 773
— Southern Abitibi greenstone belt; Archean crustal structure from seismic-reflection profiles
(Jackson, S. L., *et al.*) 11: 1086
— Thin thrust sheet formation of the Kapuskasing structural zone revealed by Lithoprobe seismic reflection data
(Geis, Wayne T., *et al.*) 6: 513

carbohydrates *see under* organic materials

carbon—geochemistry
terrigenous materials: Lignin, land plants, and fungi; biological evolution affecting Phanerozoic oxygen balance
(Robinson, Jennifer M.) 7: 607

carbon—isotopes
C-13/C-12: Carbon dioxide in clastic rocks and silicate hydrolysis
(Hutcheon, Ian, *et al.*) 6: 541
— Did major changes in the stable-isotope composition of Proterozoic seawater occur?
(Burdett, J. W., *et al.*) 3: 227
— Dolomite formation in anoxic sediments of Kau Bay, Indonesia
(Middelburg, Jack J., *et al.*) 5: 399
— Extreme ^{13}C depletions in seawater-derived brines and their implications for the past geochemical carbon cycle
(Lazar, Boaz, *et al.*) 12: 1191
— High-paleolatitude Late Cretaceous paleotemperatures; new data from James Ross Island, Antarctica
(Pirrie, D., *et al.*) 1: 31
— Hydrothermal dolomitization of Jurassic-Cretaceous limestones in the Southern Alps (Italy); relation to tectonics and volcanism
(Cervato, Cinzia) 5: 458
— Intracrystalline carbon and oxygen isotope variations in calcite revealed by laser microsampling
(Dickson, J. A. D., *et al.*) 9: 809
— Linear coupling of carbon and strontium isotopes in Rotliegend Sandstone, North Sea; evidence for cross-formational fluid flow
(Sullivan, Morgan D., *et al.*) 12: 1215
— Phosphogenesis and weathering of shelf sediments from the Southeastern United States; implications for Miocene $\delta^{13}C$ excursions and global cooling
(Compton, John S., *et al.*) 12: 1227
— Stable isotope evidence for foraminifera: habitats during the development of the Cenomanian/Turonian oceanic anoxic event; with Suppl. Data 90-07
(Corfield, R. M., *et al.*) 2: 175
— Stable-isotope record of organic carbon from an evolving carbonate banktop, Bight of Abaco, Bahamas
(Rasmussen, Kenneth A., *et al.*) 8: 790

carbonate rocks *see under* sedimentary rocks

carbonates *see under* minerals

carbonatites *see under* igneous rocks

Carboniferous *see also under* geochronology *under* Europe

Carboniferous—sedimentary petrology
sedimentary structures: Probable influence of Early Carboniferous (Tournaisian-early Visean) geography on the development of Waulsortian and Waulsortian-like mounds
(King, David T., Jr.) 7: 591

Caribbean region *see also* the individual countries

Caribbean region—tectonophysics
plate tectonics: Detailed structure and possible fluid paths at the toe of the Barbados accretionary wedge (ODP Leg 110 area)
(Lallemant, Siegfried J. C., *et al.*) 9: 854
— Model for late Neogene deformation in Panama
(Mann, Paul, *et al.*) 6: 558
— Role of extensional tectonics in exhumation of eclogites and blueschists in an oblique subduction setting; northeastern Venezuela
(Ave Lallemant, Hans G., *et al.*) 10: 950

Carpathians *see also* the individual countries

caves *see under* solution features *under* geomorphology

Cenozoic *see also* Eocene; Paleogene; Tertiary

Cenozoic—geochronology
time scales: Search for periodicity in global events in the geologic record; quo vadimus?
(Baksi, Ajoy K.) 10: 983

Central America *see also* Panama

changes of level *see also under* geomorphology *under* Indian Ocean Islands; North America; *see also under* stratigraphy *under* Atlantic Coastal Plain; Bahamas; Marshall Islands; Southeastern U.S.

changes of level—interpretation
carbonate platforms: Computer modeling the internal architecture of carbonate platforms
(Bosence, Dan, *et al.*) 1: 26

changes of level—processes
erosion: Barrier-beach erosion and rising sea level
(Dubois, Roger N.) 11: 1150

chemical analysis *see also* spectroscopy

chemical analysis—methods
spectroscopy: Intracrystalline carbon and oxygen isotope variations in calcite revealed by laser microsampling
(Dickson, J. A. D., *et al.*) 9: 809

China—geochronology
Quaternary: Episodic rapid uplift in the Himalaya revealed by $^{40}Ar/^{39}Ar$ analysis of detrital K-feldspar and muscovite, Bengal Fan
(Copeland, Peter, *et al.*) 4: 354

China—structural geology
tectonics: Paleozoic accretion and Cenozoic redeformation of the Chinese Tien Shan Range, Central Asia
(Windley, B. F., *et al.*) 2: 128

chlorine—geochemistry
brines: Origin of the oil-field brines in the Paris Basin
(Matray, Jean-Michel, *et al.*) 6: 501
connate waters: Br-Cl-Na systematics in Illinois Basin fluids; constraints on fluid origin and evolution
(Walter, Lynn M., *et al.*) 4: 315

clastic rocks *see under* sedimentary rocks

clastic sediments *see under* sediments

clay mineralogy—areal studies
Himalayas: Precollision and postcollision thermal events in the Himalaya
(Johnson, M. R. W., *et al.*) 8: 753
Italy: Hydrothermal dolomitization of Jurassic-Cretaceous limestones in the Southern Alps (Italy); relation to tectonics and volcanism
(Cervato, Cinzia) 5: 458
Pennsylvania: Hydrothermal alteration in anthracite from eastern Pennsylvania; implications for mechanisms of anthracite formation
(Daniels, Eric J., *et al.*) 3: 247

clay mineralogy—experimental studies
diagenesis: Carbon dioxide in clastic rocks and silicate hydrolysis
(Hutcheon, Ian, *et al.*) 6: 541

clay mineralogy—theoretical studies
subduction zones: On the mechanical role of smectite in subduction zones
(Vrolijk, Peter) 8: 703

climate, ancient *see* paleoclimatology

coal *see also under* economic geology *under* Pennsylvania

Colorado—geochemistry
crust: Nd- and Pb-isotope variations in the multicyclic central caldera cluster of the San Juan volcanic field, Colorado, and implications for crustal hybridization
(Riciputi, Lee R., *et al.*) 10: 975
trace elements: Geochemistry of high-potassium rocks from the mid-Tertiary Guffey volcanic center, Thirtynine Mile volcanic field, central Colorado; with Suppl. Data 90-15
(Wobus, Reinhard A., *et al.*) 7: 642

Colorado—petrology
intrusions: Mid-Proterozoic lamprophyre commingled with late-stage granitic dikes of the anorogenic San Isabel Batholith, Wet Mountains, Colorado
(Noblett, Jeffrey B., *et al.*) 2: 120

Colorado—stratigraphy
Quaternary: Stratigraphic evidence for late Quaternary dune activity near Hudson on the Piedmont of northern Colorado
(Forman, Steven L., *et al.*) 8: 745

Colorado Plateau *see also* the individual states

Colorado Plateau—geochemistry
mantle: Mantle sources in the Arizona transition zone and global mantle heterogeneity
(Cooper, Jeanne L., *et al.*) 11: 1146

Colorado Plateau—stratigraphy
Jurassic: Hydrogeology of an ancient arid closed basin; implications for tabular sandstone-hosted uranium deposits
(Sanford, Richard F.) 11: 1099

Columbia Plateau *see also* the individual states

concretions *see under* secondary structures *under* sedimentary structures

conglomerate *see also under* clastic rocks *under* sedimentary rocks

conodonts—paleoecology
marine environment: Gravitational settling of conodont elements; implications for paleoecologic interpretations of conodont assemblages
(Broadhead, Thomas W., *et al.*) 9: 850

continental drift *see also* plate tectonics

continental drift—Gondwana
Atlantic region: Sedimentological evidence for a limited separation between Armorica and Gondwana during the Early Ordovician
(Noblet, C., *et al.*) 4: 303
Eurasia: Ocean currents and unconformities; the North Gondwana Middle Devonian
(Oczlon, Martin S.) 6: 509
Western Australia: Precambrian tectonic evolution of part of Gondwana, southwestern Australia
(Myers, John S.) 6: 537

continental drift—Pangaea
regional: Two-stage rifting of Pangea by two different mechanisms
(Hynes, Andrew) 4: 323

continental drift—Tethys
regional: Tethys, Thetis, Thethys, or Thetys? What, where, and when was it?; discussion
(Sengor, A. M. C.) 6: 575
— Tethys, Thetis, Thethys, or Thetys? What, where, and when was it?; reply
(Tozer, E. T.) 6: 575

continental margin *see also under* oceanography *under* Australia; Eastern U.S.; Mauritania

continental shelf *see also* marine geology; *see also under* oceanography *under* Great Britain

continental slope *see also* marine geology

copper ores *see also under* economic geology *under* Fiji; Papua New Guinea; Philippine Islands; Solomon Islands

copper ores—genesis
controls: Integrated tectonic-genetic model for volcanic-hosted massive sulfide deposits
(Sawkins, Frederick J.) 11: 1061

Corsica—structural geology
tectonics: Ductile extension in Alpine Corsica
(Jolivet, Laurent, *et al.*) 10: 1007

Cretaceous *see also under* geochronology *under* British Columbia; California; Idaho; Nevada; USSR; Utah; *see also under* stratigraphy *under* Alabama; Antarctica; Atlantic Ocean; England; India; Mediterranean Sea; Montana; Nevada; Pacific Ocean; Texas

Cretaceous—stratigraphy
boundary: Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; discussion
(Kyte, Frank T.) 1: 87
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; discussion
(Bohor, Bruce F.) 1: 88
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; reply
(Schmitz, Birger) 1: 89
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; discussion
(Triplehorn, D. M.) 1: 92
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; reply
(Schmitz, Birger) 1: 93
paleoclimatology: "Equable" climates during Earth history?
(Sloan, L. Cirbus, *et al.*) 6: 489

crust *see also under* geochemistry *under* California; Colorado; *see also under* tectonophysics *under* Alaska; Alps; Andes; Appalachians; Arabian Peninsula; Atlantic Ocean; Bolivia; California; Canadian Shield; Eastern U.S.; Egypt; Gulf Coastal Plain; Idaho; Maine; Middle East; Nevada; New Zealand; North America; Northwest Territories; Pacific Coast; Scandinavia; Southwestern U.S.; Syria; USSR; Western Australia; Western U.S.; Wyoming

crust—evolution
rates: Use and abuse of crustal accretion calculations
(Pallister, John S., *et al.*) 1: 35
— Use and abuse of crustal accretion calculations; discussion
(Church, W. R.) 12: 1258
— Use and abuse of crustal accretion calculations; reply
(Pallister, John S., *et al.*) 12: 1259

crust—properties
elastic properties: Stratigraphic modeling of foreland basins; interpreting thrust deformation and lithosphere rheology
(Flemings, Peter B., *et al.*) 5: 430
thermomechanical properties: Generating melt during lithospheric extension; pure shear vs. simple shear
(Latin, Dave, *et al.*) 4: 327

crystal chemistry *see also* crystal growth; minerals

crystal chemistry—carbonates
calcite: New type of compositional zoning in calcite; insights into crystal-growth mechanisms
(Paquette, Jeanne, *et al.*) 12: 1244

crystal chemistry—chain silicates, clinopyroxene
substitution: Discrimination of ophiolitic from nonophiolitic ultramafic-mafic allochthons in orogenic belts by the Al/Ti ratio in clinopyroxene
(Loucks, Robert R.) 4: 346

crystal growth *see also* crystal chemistry; minerals

crystal growth—carbonates
calcite: Channelized fluid flow through shear zones during fluid-enhanced dynamic recrystallization, Northern Apennines, Italy
(Carter, Karen E., *et al.*) 8: 720
— Intracrystalline carbon and oxygen isotope variations in calcite revealed by laser microsampling
(Dickson, J. A. D., *et al.*) 9: 809
— New type of compositional zoning in calcite; insights into crystal-growth mechanisms
(Paquette, Jeanne, *et al.*) 12: 1244

crystal growth—framework silicates, plagioclase
myrmekite: Cathodoluminescence microscopy of myrmekite
(Hopson, R. Forrest, *et al.*) 4: 336
— Cathodoluminescence microscopy of myrmekite; discussion
(Collins, Lorence G.) 11: 1163
— Cathodoluminescence microscopy of myrmekite; reply
(Hopson, R. Forrest, *et al.*) 11: 1163

crystal growth—framework silicates, silica minerals
quartz: Force of crystallization during the growth of siliceous concretions
(Dewers, Thomas, *et al.*) 3: 204
— Water-sill hypothesis for the origin of certain veins in the Meguma Group, Nova Scotia, Canada
(Henderson, J. R., *et al.*) 7: 654

crystal growth—orthosilicates, epidote group
grain size: Crystal size of epidotes; a potentially exploitable geothermometer in geothermal fields?
(Patrier, Patricia, *et al.*) 11: 1126

crystal growth—orthosilicates, garnet group
zoning: Growth and retrograde zoning in garnets from high-grade metapelites; implications for pressure-temperature paths
(Tuccillo, M. E., *et al.*) 9: 839
— Rapid growth and strain rates inferred from synkinematic garnets, Penokean Orogeny, Minnesota
(Holm, Daniel K., *et al.*) 2: 166

crystal growth—sulfates
gypsum: Diagenetic, nonevaporative origin for gypsum
(Bain, Roger J.) 5: 447

crystal structure *see also* crystal chemistry; crystal growth; minerals

Cyprus—geochronology
Pleistocene: Late Quaternary uplift of the Troodos Ophiolite, Cyprus; uranium-series dating of Pleistocene coral
(Poole, Andrew J., *et al.*) 9: 894

Cyprus—structural geology
neotectonics: Late Quaternary uplift of the Troodos Ophiolite, Cyprus; uranium-series dating of Pleistocene coral
(Poole, Andrew J., *et al.*) 9: 894

data processing—oceanography
sedimentation: Computer modeling the internal architecture of carbonate platforms
(Bosence, Dan, *et al.*) 1: 26

data processing—stratigraphy
paleoclimatology: "Equable" climates during Earth history?
(Sloan, L. Cirbus, *et al.*) 6: 489

deformation *see also* structural analysis

deformation—field studies
recrystallization: Channelized fluid flow through shear zones during fluid-enhanced dynamic recrystallization, Northern Apennines, Italy
(Carter, Karen E., *et al.*) 8: 720
shatter cones: Shatter cones and shocked rocks in southwestern Montana; the Beaverhead impact structure
(Hargraves, R. B., *et al.*) 9: 832
shear: Direction and shear sense during suturing of the Seven Devils-Wallowa Terrane against North America in western Idaho; discussion
(Lund, Karen, *et al.*) 10: 1031
— Direction and shear sense during suturing of the Seven Devils-Wallowa Terrane against North America in western Idaho; reply
(Strayer, Luther M., IV, *et al.*) 10: 1031
— Implications of shear-sense criteria for the tectonic evolution of the central Rhodope Massif, southern Bulgaria
(Burg, Jean-Pierre, *et al.*) 5: 451
— Late Precambrian crustal extension preserved in Fries fault zone mylonites, Southern Appalachians; discussion
(Eckert, James O., Jr.) 4: 379
— Late Precambrian crustal extension preserved in Fries fault zone mylonites, Southern Appalachians; reply
(Simpson, Carol, *et al.*) 4: 380
— Tectonic control on the origin and orientation of igneous layering; an example from the Greendale Complex, Antigonish Highlands, Nova Scotia, Canada
(Murphy, J. Brendan, *et al.*) 5: 403
— Timing and kinematics of deformation in the Cronese Hills, California, and implications for Mesozoic structure of the southwestern Cordillera
(Walker, J. Douglas, *et al.*) 6: 554
strain: Bent chert tubes in the Phosphoria Formation of Wyoming; pressure solution strain markers
(Scotford, David M., *et al.*) 9: 846
— Rapid growth and strain rates inferred from synkinematic garnets, Penokean Orogeny, Minnesota
(Holm, Daniel K., *et al.*) 2: 166

deformation—theoretical studies
cracks: Application of linear elastic fracture mechanics to the quantitative evaluation of fluid-inclusion decrepitation
(Lacazette, Alfred) 8: 782
mylonitization: Mass-transport mechanisms in deforming rocks; recognition using microstructural and microchemical criteria
(McCaig, Andrew M., *et al.*) 9: 824

deposition *see under* sedimentation

deposition of ores *see* mineral deposits, genesis

deserts *see under* eolian features *under* geomorphology

Devonian *see also under* geochronology *under* Alabama; Appalachians; New Hampshire; *see also under* stratigraphy *under* Eurasia; Western Australia

Devonian—stratigraphy
paleo-oceanography: Ocean currents and unconformities; the North Gondwana Middle Devonian
(Oczlon, Martin S.) 6: 509

diagenesis *see also* sedimentation

diagenesis—cementation
aquitards: Geologic and environmental aspects of surface cementation, north coast, Yucatan, Mexico; discussion
(Smart, P. L., *et al.*) 8: 802

— Geologic and environmental aspects of surface cementation, north coast, Yucatan, Mexico; reply
(Perry, Eugene, *et al.*) 8: 803

diagenesis—controls
changes of level: Post-Miocene diagenetic and eustatic history of Enewetak Atoll; model and data comparison
(Quinn, Terrence M., *et al.*) 10: 942

diagenesis—dolomitization
anaerobic environment: Dolomite formation in anoxic sediments of Kau Bay, Indonesia
(Middelburg, Jack J., *et al.*) 5: 399
environment: Active circulation of saline ground waters in carbonate platforms; evidence from the Great Bahama Bank
(Whitaker, F. F., *et al.*) 3: 200
geochemical indicators: Abu Dhabi Sabkha, Persian Gulf, revisited; application of strontium isotopes to test an early dolomitization model
(Muller, Daniel W., *et al.*) 7: 618
hydrothermal conditions: Hydrothermal dolomitization of Jurassic-Cretaceous limestones in the Southern Alps (Italy); relation to tectonics and volcanism
(Cervato, Cinzia) 5: 458

diagenesis—effects
karstification: Glaciation and saline-freshwater mixing as a possible cause of cave formation in the eastern Midcontinent region of the United States; a conceptual model
(Panno, Samuel V., *et al.*) 8: 769
porosity: Diagenetic quartzarenite and destruction of secondary porosity; an example from the Middle Jurassic Brent Sandstone of Northwest Europe; discussion
(Scotchman, I. C.) 8: 799
— Diagenetic quartzarenite and destruction of secondary porosity; an example from the Middle Jurassic Brent Sandstone of Northwest Europe; reply
(Harris, Nicholas B.) 8: 799
subduction: On the mechanical role of smectite in subduction zones
(Vrolijk, Peter) 8: 703

diagenesis—environment
glaciolacustrine environment: Diagenetic, nonevaporative origin for gypsum
(Bain, Roger J.) 5: 447
subaerial environment: Ancient subaerial exposure and freshwater leaching in sandstones
(Emery, D., *et al.*) 12: 1178
— Phosphogenesis and weathering of shelf sediments from the Southeastern United States; implications for Miocene $\delta^{13}C$ excursions and global cooling
(Compton, John S., *et al.*) 12: 1227

diagenesis—geochemistry
iridium: Acraman impact ejecta and host shales; evidence for low-temperature mobilization of iridium and other platinoids
(Wallace, Malcolm W., *et al.*) 2: 132
isotopes: Did major changes in the stable-isotope composition of Proterozoic seawater occur?
(Burdett, J. W., *et al.*) 3: 227
— Linear coupling of carbon and strontium isotopes in Rotliegend Sandstone, North Sea; evidence for cross-formational fluid flow
(Sullivan, Morgan D., *et al.*) 12: 1215
organic materials: Response of Th/U in deep Labrador Sea sediments (ODP Site 646) to changes in sedimentation rates and paleoproductivities
(Hillaire-Marcel, C., *et al.*) 2: 162
solution: Evidence for episodic basin dewatering in salt-dome cap rocks
(Hallager, W. S., *et al.*) 8: 716
sulfur: Sulfidization of Witwatersrand black sands; from enigma to myth
(Reimer, Thomas O., *et al.*) 5: 426
trace elements: New distribution coefficient for the incorporation of strontium into dolomite and its implications for the formation of ancient dolomites
(Vahrenkamp, Volker C., *et al.*) 5: 387

diagenesis—indicators
porosity: New microtextural criterion for differentiation of compaction and early cementation in fine-grained limestones
(Lasemi, Zakaria, *et al.*) 4: 370

diagenesis—materials
quartz arenite: Diagenetic quartzarenite and destruction of secondary porosity; an example from the Middle Jurassic Brent Sandstone of Northwest Europe; discussion
(Shanmugam, G.) 3: 287
— Diagenetic quartzarenite and destruction of secondary porosity; an example from the Middle Jurassic Brent Sandstone of Northwest Europe; reply
(Harris, Nicholas B.) 3: 288

diagenesis—mechanism
pressure: Force of crystallization during the growth of siliceous concretions
(Dewers, Thomas, *et al.*) 3: 204

diagenesis—processes
coalification: Hydrothermal alteration in anthracite from eastern Pennsylvania; implications for mechanisms of anthracite formation
(Daniels, Eric J., *et al.*) 3: 247
compaction: Spiny ooids; early subaerial deformation as opposed to late burial compaction
(Davaud, E., *et al.*) 9: 816
hydrolysis: Carbon dioxide in clastic rocks and silicate hydrolysis
(Hutcheon, Ian, *et al.*) 6: 541

diagenesis—theoretical studies
sedimentation: Preservation potential of sedimentary event layers
(Wheatcroft, Robert A.) 9: 843

diapirs *see under* style *under* folds

diastrophism *see* orogeny; tectonics

dikes *see under* intrusions

diorites *see under* igneous rocks

dolomite *see under* geochemistry *under* strontium

dolomitization *see under* diagenesis

drumlins *see under* glacial features *under* glacial geology

earthquakes *see also* seismology; *see also under* seismology *under* Eastern U.S.; Mississippi Valley; Quebec

Eastern Hemisphere *see also* Africa; Antarctica; Asia; Atlantic Ocean; Eurasia; Europe; Indian Ocean; USSR

Eastern U.S. *see also* Georgia; Maine; Maryland; New England; New Hampshire; New Jersey; New York; North Carolina; Pennsylvania; South Carolina; Vermont; Virginia; West Virginia

Eastern U.S.—oceanography
continental margin: Crustal structure of the Southeast Georgia Embayment-Carolina Trough; preliminary results of a composite seismic image of a continental suture(?) and a volcanic passive margin
(Austin, James A., Jr., *et al.*) 10: 1023

Eastern U.S.—seismology
earthquakes: Diapiric origin of the Blytheville and Pascola arches in the Reelfoot Rift, east-central United States; relation to New Madrid seismicity
(McKeown, F. A., *et al.*) 11: 1158

Eastern U.S.—tectonophysics
crust: A tale of two sutures; COCORP's deep seismic surveys of the Grenville Province in the Eastern U.S. Midcontinent
(Culotta, Raymond C., *et al.*) 7: 646
— Gulf Coast-East Coast magnetic anomaly; I, Root of the main crustal decollement for the Appalachian-Ouachita Orogen
(Hall, David J.) 9: 862

ecology—algal flora
lacustrine environment: Cyanobacterial precipitation of gypsum, calcite, and magnesite from natural alkaline lake water
(Thompson, J. B., *et al.*) 10: 995

ecology—mollusks
intertidal environment: Sampling, species abundance, and the stratigraphic signature of mass extinction; a test using Holocene tidal flat molluscs
(Meldahl, Keith H.) 9: 890

ecology—observations
hypersaline environment: Extreme ^{13}C depletions in seawater-derived brines and their implications for the past geochemical carbon cycle
(Lazar, Boaz, *et al.*) 12: 1191
ecology—ostracods
lacustrine environment: Magnesium-salinity relation in the saline lake ostracode Cyprideis americana
(Teeter, James W., *et al.*) 3: 220
Egypt—geochemistry
trace elements: Geochronologic and isotopic evidence for involvement of pre-Pan-African crust in the Nubian Shield, Egypt
(Sultan, Mohamed, *et al.*) 8: 761
Egypt—geochronology
Proterozoic: Early Pan-African evolution of the basement around Elat, Israel, and the Sinai Peninsula revealed by single-zircon evaporation dating, and implications for crustal accretion rates
(Kroner, A., *et al.*) 6: 545
— Geochronologic and isotopic evidence for involvement of pre-Pan-African crust in the Nubian Shield, Egypt
(Sultan, Mohamed, *et al.*) 8: 761
Egypt—structural geology
tectonics: Orientation of late Precambrian sutures in the Arabian-Nubian shield
(Stern, Robert J., *et al.*) 11: 1103
Egypt—tectonophysics
crust: Geochronologic and isotopic evidence for involvement of pre-Pan-African crust in the Nubian Shield, Egypt
(Sultan, Mohamed, *et al.*) 8: 761
electron microscopy *see also* chemical analysis; spectroscopy
energy sources *see also* natural gas; petroleum
engineering geology *see also* deformation; geologic hazards; geophysical methods; ground water; rock mechanics
England—stratigraphy
Cretaceous: Stable isotope evidence for foraminiferal habitats during the development of the Cenomanian/Turonian oceanic anoxic event; with Suppl. Data 90-07
(Corfield, R. M., *et al.*) 2: 175
environmental geology *see also* ecology; geologic hazards
Eocene *see also under* geochronology *under* California; *see also under* stratigraphy *under* Washington
Eocene—stratigraphy
paleoclimatology: "Equable" climates during Earth history?
(Sloan, L. Cirbus, *et al.*) 6: 489
eolian features *see under* geomorphology
epeirogeny *see also* changes of level; neotectonics; orogeny; tectonics
erosion *see under* processes *under* geomorphology
eruptive rocks *see* igneous rocks
Eurasia—stratigraphy
Devonian: Ocean currents and unconformities; the North Gondwana Middle Devonian
(Oczlon, Martin S.) 6: 509
Eurasia—tectonophysics
plate tectonics: Paleozoic accretion and Cenozoic redeformation of the Chinese Tien Shan Range, Central Asia
(Windley, B. F., *et al.*) 2: 128
Europe *see also* Alps; Austria; Bulgaria; England; Finland; France; Great Britain; Greece; Norway; Scandinavia; Scotland; Spain; Sweden; Wales; West Germany
Europe—geochronology
Carboniferous: Pennsylvanian time scales and cycle periods
(Klein, George DeVries) 5: 455
Europe—petrology
metamorphism: Archean protoliths within early Proterozoic granulitic crust of the West European Hercynian belt; possible relics of the West African Craton; discussion
(Kuijper, R. P.) 4: 382
— Archean protoliths within early Proterozoic granulitic crust of the West European Hercynian belt; possible relics of the West African craton; reply
(Guerrot, C., *et al.*) 4: 383
Europe—sedimentary petrology
diagenesis: Diagenetic quartzarenite and destruction of secondary porosity; an example from the Middle Jurassic Brent Sandstone of Northwest Europe; discussion
(Shanmugam, G.) 3: 287
— Diagenetic quartzarenite and destruction of secondary porosity; an example from the Middle Jurassic Brent Sandstone of Northwest Europe; reply
(Harris, Nicholas B.) 3: 288
— Diagenetic quartzarenite and destruction of secondary porosity; an example from the Middle Jurassic Brent Sandstone of Northwest Europe; discussion
(Scotchman, I. C.) 8: 799
— Diagenetic quartzarenite and destruction of secondary porosity; an example from the Middle Jurassic Brent Sandstone of Northwest Europe; reply
(Harris, Nicholas B.) 8: 799
Europe—tectonophysics
plate tectonics: I-type granitoids as indicators of a late Paleozoic convergent ocean-continent margin along the southern flank of the central European Variscan Orogen
(Finger, F., *et al.*) 12: 1207
experimental studies *see under* clay mineralogy; fluid inclusions; fractures; marine geology; micropaleontology; phase equilibria; *see under* peridotites *under* phase equilibria
Far East *see also* the individual countries
faulting *see* faults
faults *see also* folds; tectonics
faults—displacements
active faults: Northeastern Basin and Range Province active tectonics; an alternative view; discussion
(Anders, Mark H., *et al.*) 9: 914
— Northeastern Basin and Range Province active tectonics; an alternative view; reply
(Westaway, Rob) 9: 915
— Timing of late Quaternary faulting in the 1954 Dixie Valley earthquake area, central Nevada
(Bell, John W., *et al.*) 7: 622
— Transverse Ranges and neotectonics of Southern California
(Hill, Mason L.) 1: 23
— Visibility of fault strands in exploratory trenches and timing of rupture events
(Bonilla, Manuel G., *et al.*) 2: 153
decollement: Constraints on friction and stress in the Taiwan fold-and-thrust belt from heat flow and geochronology
(Barr, Terence D., *et al.*) 2: 111
— Transpression, orogenic float, and lithospheric balance
(Oldow, John S., *et al.*) 10: 991
extension faults: Extensional duplex in the Purcell Mountains of southeastern British Columbia
(Root, Kevin G.) 5: 419
— Pattern of extensional faulting in pelagic carbonates of the Umbria-Marche Apennines of central Italy
(Alvarez, Walter) 5: 407
normal faults: Late Paleozoic extension in the Great Basin, Western United States
(Smith, David Lee, *et al.*) 8: 712
reactivation: Ductile extension in Alpine Corsica
(Jolivet, Laurent, *et al.*) 10: 1007
— Focused fluid flow and Ozark mississippi valley-type deposits
(Clendenin, C. W., *et al.*) 2: 116
— Regional significance of recurrent faulting and intracanyon volcanism at Oak Creek canyon, southern Colorado Plateau, Arizona; with Suppl. Data 90-23
(Holm, Richard F., *et al.*) 10: 1014
— Transtensional arm of the early Mesozoic Fundy rift basin; penecontemporaneous faulting and sedimentation
(Olsen, Paul E., *et al.*) 8: 695
strike-slip faults: Intra-arc strike-slip fault exposed at batholithic levels in the southern Sierra Nevada, California
(Busby-Spera, Cathy J., *et al.*) 3: 255

— Model for late Neogene deformation in Panama
(Mann, Paul, *et al.*) 6: 558
thrust faults: Cenozoic thrust emplacement of a Devonian batholith, northeastern Brooks Range; involvement of crystalline rocks in a foreland fold-and-thrust belt
(Hanks, Catherine L., *et al.*) 5: 395
— Dillon Cutoff; basement involved tectonic link between the Disturbed Belt of west-central Montana and overthrust belt of extreme southwestern Montana
(O'Neill, J. Michael, *et al.*) 11: 1107
— Evolution of antivergent folds on a Paleozoic accretionary prism, Arkansas; an alternative view
(Babaei, Abdolali) 10: 987
— Implications of shear-sense criteria for the tectonic evolution of the central Rhodope Massif, southern Bulgaria
(Burg, Jean-Pierre, *et al.*) 5: 451
— Late Cretaceous extension in the hinterland of the Sevier thrust belt, northwestern Utah and southern Idaho; with Suppl. Data 90-20
(Wells, Michael L., *et al.*) 10: 929
— Middle Proterozoic piggyback basin in the subsurface of northwestern Canada
(Cook, Frederick A., *et al.*) 7: 662
— Paleozoic accretion and Cenozoic redeformation of the Chinese Tien Shan Range, Central Asia
(Windley, B. F., *et al.*) 2: 128
— Regionally extensive mid-Cretaceous west-vergent thrust system in the northwestern Cordillera; implications for continent-margin tectonism
(Rubin, Charles M., *et al.*) 3: 276
— Southern Abitibi greenstone belt; Archean crustal structure from seismic-reflection profiles
(Jackson, S. L., *et al.*) 11: 1086
— Stratigraphic modeling of foreland basins; interpreting thrust deformation and lithosphere rheology
(Flemings, Peter B., *et al.*) 5: 430
— Thin thrust sheet formation of the Kapuskasing structural zone revealed by Lithoprobe seismic reflection data
(Geis, Wayne T., *et al.*) 6: 513
transcurrent faults: Kinematic model for southwestern Newfoundland based upon Silurian sinistral shearing; discussion
(Blewett, R. S., *et al.*) 12: 1257
— Kinematic model for southwestern Newfoundland based upon Silurian sinistral shearing; reply
(Currie, K. L., *et al.*) 12: 1257

faults—distribution
fault zones: Reflections from mantle fault zones around the British Isles
(Flack, Catherine A., *et al.*) 6: 528
mid-ocean ridges: Causes of variation in fault-facing direction on the ocean floor
(Carbotte, Suzanne M., *et al.*) 8: 749
terranes: Ocmulgee Fault; the Piedmont-Avalon terrane boundary in central Georgia
(Hooper, Robert J., *et al.*) 8: 708

faults—effects
mylonites: Folding of mylonitic zones in Cordilleran metamorphic core complexes; evidence from near the mylonitic front
(Reynolds, Stephen J., *et al.*) 3: 216
— Late Precambrian crustal extension preserved in Fries fault zone mylonites, Southern Appalachians; discussion
(Eckert, James O., Jr.) 4: 379
— Late Precambrian crustal extension preserved in Fries fault zone mylonites, Southern Appalachians; reply
(Simpson, Carol, *et al.*) 4: 380
shear zones: A tale of two sutures; COCORP's deep seismic surveys of the Grenville Province in the Eastern U.S. Midcontinent
(Culotta, Raymond C., *et al.*) 7: 646
— Channelized fluid flow through shear zones during fluid-enhanced dynamic recrystallization, Northern Apennines, Italy
(Carter, Karen E., *et al.*) 8: 720
— Direction and shear sense during suturing of the Seven Devils-Wallowa Terrane against North America in western Idaho; discussion
(Lund, Karen, *et al.*) 10: 1031
— Direction and shear sense during suturing of the Seven Devils-Wallowa Terrane against North America in western Idaho; reply
(Strayer, Luther M., IV, *et al.*) 10: 1031
— Orientation of late Precambrian sutures in the Arabian-Nubian shield
(Stern, Robert J., *et al.*) 11: 1103
— Timing and kinematics of deformation in the Cronese Hills, California, and implications for Mesozoic structure of the southwestern Cordillera
(Walker, J. Douglas, *et al.*) 6: 554

faults—interpretation
fault zones: Morphology of the Frontal fault zone, Southwest Oklahoma; implications for deformation and deposition in the Wichita Uplift and Anadarko Basin; with Suppl. Data 90-16
(McConnell, David A., *et al.*) 7: 634

faults—systems
block structures: Geobarometry, differential block movements, and crustal structure of the southwestern Abitibi greenstone belt, Canada
(Feng, Rui, *et al.*) 9: 870
— Growth, stabilization, and reactivation of Proterozoic lithosphere in the Southwestern United States
(Bowring, Samuel A., *et al.*) 12: 1203
— Major off-axis hydrothermal activity on the northern Gorda Ridge
(Rona, Peter A., *et al.*) 6: 493
— Paleomagnetic evidence for counterclockwise block rotation in the North Nevada rift region
(Li, Yianping, *et al.*) 1: 79
grabens: Middle Eocene dike swarms and their relation to contemporaneous plutonism, volcanism, core-complex mylonitization, and graben subsidence, Okanogan Highlands, Washington; with Suppl. Data 90-27
(Holder, Grace A. McCarley, *et al.*) 11: 1082
— Multiple detachment model for the early rifting stage of the late Proterozoic Damara Orogen in Namibia
(Henry, G., *et al.*) 1: 67
rift zones: Major Proterozoic basement features of the eastern Midcontinent of North America revealed by recent COCORP profiling; discussion
(Nelson, W. John) 4: 378
— Major Proterozoic basement features of the eastern Midcontinent of North America revealed by recent COCORP profiling; reply
(Pratt, Thomas, *et al.*) 4: 378
— Rotation of extension direction in the central Kenya Rift
(Strecker, M. R., *et al.*) 4: 299

Federal Republic of Germany *see* West Germany

Fiji—economic geology
copper ores: Subduction, arc reversal, and the origin of porphyry copper-gold deposits in island arcs
(Solomon, M.) 7: 630
gold ores: Subduction, arc reversal, and the origin of porphyry copper-gold deposits in island arcs
(Solomon, M.) 7: 630

Finland—geomorphology
glacial geology: Drumlins, subglacial meltwater floods, and ocean responses; discussion
(Forsstrom, Lars) 8: 804

fission-track dating *see under* geochronology

fluid inclusions *see also* inclusions

fluid inclusions—experimental studies
thermal effects: Healing of microcracks in quartz; implications for fluid flow
(Brantley, Susan L., *et al.*) 2: 136

fluid inclusions—geologic thermometry
decrepitation: Application of linear elastic fracture mechanics to the quantitative evaluation of fluid-inclusion decrepitation
(Lacazette, Alfred) 8: 782
interpretation: Fluid-inclusion technique for determining maximum temperature in calcite and its comparison to the vitrinite reflectance geo-

thermometer; with Suppl. Data 90-22
(Barker, Charles E., *et al.*) 10: 1003
fluvial features *see under* geomorphology
folding *see* folds
folds *see also* faults; foliation; tectonics
folds—distribution
Arkansas: Evolution of antivergent folds on a Paleozoic accretionary prism, Arkansas; an alternative view
(Babaei, Abdolali) 10: 987
folds—mechanics
flexure: Lithosphere folds in the Eurekan Orogen, Arctic Canada?
(Stephenson, R. A., *et al.*) 7: 603
shear: Folding of mylonitic zones in Cordilleran metamorphic core complexes; evidence from near the mylonitic front
(Reynolds, Stephen J., *et al.*) 3: 216
folds—style
anticlines: Origin of arches in the northwestern Gulf of Mexico basin
(Laubach, Stephen E., *et al.*) 7: 595
diapirs: Diapiric origin of the Blytheville and Pascola arches in the Reelfoot Rift, east-central United States; relation to New Madrid seismicity
(McKeown, F. A., *et al.*) 11: 1158
foliation *see also* folds; structural analysis
foliation—interpretation
anisotropy: Seismic anisotropy due to preferred mineral orientation observed in shallow crustal rocks in southern Alaska
(Brocher, Thomas M., *et al.*) 8: 737
foraminifera *see also* foraminifers
foraminifers—biochemistry
isotopes: High-latitude application of $^{87}Sr/^{86}Sr$; correlation of Nuwok beds on North Slope, Alaska, to standard Oligocene chronostratigraphy
(McNeil, David H., *et al.*) 5: 415
— Response of Th/U in deep Labrador Sea sediments (ODP Site 646) to changes in sedimentation rates and paleoproductivities
(Hillaire-Marcel, C., *et al.*) 2: 162
foraminifers—biostratigraphy
Cretaceous: Brief reversed polarity interval during the Cretaceous normal polarity superchron
(Tarduno, John A.) 8: 683
Paleozoic: Paleontological evidence of Paleozoic age for the Walden Creek Group, Ocoee Supergroup, Tennessee
(Unrug, Raphael, *et al.*) 11: 1041
Permian: Permian chronostratigraphy in Kansas
(Baars, D. L.) 8: 687
Pliocene: High eustatic sea level during the middle Pliocene; evidence from the Southeastern U.S. Atlantic Coastal Plain; with Suppl. Data 90-13
(Dowsett, Harry J., *et al.*) 5: 435
foraminifers—paleoecology
Cretaceous: Stable isotope evidence for foraminiferal habitats during the development of the Cenomanian/Turonian oceanic anoxic event; with Suppl. Data 90-07
(Corfield, R. M., *et al.*) 2: 175
Holocene: Stable-isotope record of organic carbon from an evolving carbonate banktop, Bight of Abaco, Bahamas
(Rasmussen, Kenneth A., *et al.*) 8: 790
Formosa *see* Taiwan
fossils *see* appropriate fossil group
fossils, problematic *see* problematic fossils
foundations *see also* rock mechanics
fractures—experimental studies
microcracks: Healing of microcracks in quartz; implications for fluid flow
(Brantley, Susan L., *et al.*) 2: 136
fractures—style
extension fractures: Water-sill hypothesis for the origin of certain veins in the Meguma Group, Nova Scotia, Canada
(Henderson, J. R., *et al.*) 7: 654
joints: Hydrothermal alteration in anthracite from eastern Pennsylvania; implications for mechanisms of anthracite formation
(Daniels, Eric J., *et al.*) 3: 247
— Late Cretaceous age of fractures in the Sierra Nevada Batholith, California
(Segall, Paul, *et al.*) 12: 1248
fractures—theoretical studies
fluid inclusions: Application of linear elastic fracture mechanics to the quantitative evaluation of fluid-inclusion decrepitation
(Lacazette, Alfred) 8: 782
France—economic geology
petroleum: Origin of the oil-field brines in the Paris Basin
(Matray, Jean-Michel, *et al.*) 6: 501
fuel resources *see also* natural gas; petroleum
gabbros *see under* igneous rocks
gas inclusions *see* fluid inclusions
gas, natural *see* natural gas
genesis of ore deposits *see* mineral deposits, genesis
geochemistry—geochemical cycle
carbon: Extreme ^{13}C depletions in seawater-derived brines and their implications for the past geochemical carbon cycle
(Lazar, Boaz, *et al.*) 12: 1191
— Lignin, land plants, and fungi; biological evolution affecting Phanerozoic oxygen balance
(Robinson, Jennifer M.) 7: 607
geochemistry—processes
chemical fractionation: Rare earth elements as indicators of different marine depositional environments in chert and shale
(Murray, Richard W., *et al.*) 3: 268
— Speciation and solubility of palladium in aqueous magmatic-hydrothermal solutions
(Sassani, David C., *et al.*) 10: 925
dissociation: Experimental study bearing on the absence of carbonate in mantle-derived xenoliths
(Canil, Dante) 10: 1011
hydrolysis: Carbon dioxide in clastic rocks and silicate hydrolysis
(Hutcheon, Ian, *et al.*) 6: 541
ion exchange: Sodium-calcium ion exchange in the weathering of shales; implications for global weathering budgets; discussion
(Berner, Robert A., *et al.*) 2: 190
— Sodium-calcium ion exchange in the weathering of shales; implications for global weathering budgets; reply
(Cerling, Thure E., *et al.*) 2: 190
mass transfer: Mass-transport mechanisms in deforming rocks; recognition using microstructural and microchemical criteria
(McCaig, Andrew M., *et al.*) 9: 824
oxidation: Diagenetic, nonevaporative origin for gypsum
(Bain, Roger J.) 5: 447
partitioning: Noble gas and methane partitioning from ground water; an aid to natural gas exploration and reservoir evaluation
(Zaikowski, Anthony, *et al.*) 1: 72
reduction: Fe(III)-reducing bacteria in deeply buried sediments of the Atlantic Coastal Plain
(Lovley, Derek R., *et al.*) 10: 954
solution: Evidence for episodic basin dewatering in salt-dome cap rocks
(Hallager, W. S., *et al.*) 8: 716
geochemistry—properties
alkalinity: Dolomite formation in anoxic sediments of Kau Bay, Indonesia
(Middelburg, Jack J., *et al.*) 5: 399
Eh: Selenium in aqueous solutions; the impossibility of obtaining a meaningful Eh using a platinum electrode, with implications for modeling of natural waters
(Runnells, Donald D., *et al.*) 3: 212
geochronology *see also* absolute age
geochronology—fission-track dating
Cretaceous: Northern Monashee Mountains, Omineca crystalline belt, British Columbia; timing of metamorphism, anatexis, and tectonic denudation; with Suppl. Data 90-06
(Sevigny, J. H., *et al.*) 2: 103

geochronology—paleomagnetism
Cretaceous: Brief reversed polarity interval during the Cretaceous normal polarity superchron
(Tarduno, John A.) 8: 683
Devonian: Magnetostratigraphy, Late Devonian iridium anomaly, and impact hypotheses
(Hurley, Neil F., *et al.*) 4: 291
Neogene: Post-Miocene diagenetic and eustatic history of Enewetak Atoll; model and data comparison
(Quinn, Terrence M., *et al.*) 10: 942

geochronology—tephrochronology
loess: A 3 m.y. record of Pliocene-Pleistocene loess in interior Alaska
(Westgate, John A., *et al.*) 9: 858
— Paleoclimatic forcing of magnetic susceptibility variations in Alaskan loess during the late Quaternary
(Beget, James E., *et al.*) 1: 40

geochronology—thermoluminescence
Paleosols: Stratigraphic evidence for late Quaternary dune activity near Hudson on the Piedmont of northern Colorado
(Forman, Steven L., *et al.*) 8: 745

geochronology—time scales
Pennsylvanian: Pennsylvanian time scales and cycle periods
(Klein, George DeVries) 5: 455
Phanerozoic: Search for periodicity in global events in the geologic record; quo vadimus?
(Baksi, Ajoy K.) 10: 983
Proterozoic: Precambrian time units and nomenclature; the geon concept
(Hofmann, H. J.) 4: 340

geochronology—tree rings
Holocene: Dendrogeomorphic approach to estimating slope retreat, Maxey Flats, Kentucky
(Hupp, Cliff R., *et al.*) 7: 658

geologic barometry *see under* P-T conditions *under* metamorphism

geologic hazards—faults
rupture: Visibility of fault strands in exploratory trenches and timing of rupture events
(Bonilla, Manuel G., *et al.*) 2: 153

geologic thermometry *see under* fluid inclusions

geologic time *see* absolute age; geochronology

geology—practice
history: The world turned inside out
(Nisbet, E. G.) 1: 4
methods: Method of multiple working hypotheses; a chimera
(Johnson, J. G.) 1: 44
— Method of multiple working hypotheses; a chimera; discussion
(Railsback, L. Bruce) 9: 917
— Method of multiple working hypotheses; a chimera; discussion
(Locke, William W.) 9: 918
— Method of multiple working hypotheses; a chimera; reply
(Johnson, J. G.) 9: 918
publications: Comments from a retiring editor
(Bickford, M. E.) 1: 3

geomorphology *see also* glacial geology

geomorphology—controls
tectonic controls: Rapid Quaternary emergence, uplift, and denudation of the Coastal Range, eastern Taiwan
(Lundberg, Neil, *et al.*) 7: 638
— Regional significance of recurrent faulting and intracanyon volcanism at Oak Creek canyon, southern Colorado Plateau, Arizona; with Suppl. Data 90-23
(Holm, Richard F., *et al.*) 10: 1014
— Surface uplift, uplift of rocks, and exhumation of rocks
(England, Philip, *et al.*) 12: 1173

geomorphology—eolian features
continental dunes: Stratigraphic evidence for late Quaternary dune activity near Hudson on the Piedmont of northern Colorado
(Forman, Steven L., *et al.*) 8: 745
deserts: Development of the Gran Desierto sand sea, northwestern Mexico
(Blount, Grady, *et al.*) 8: 724

geomorphology—fluvial features
channels: Fluvial response to debris associated with mass wasting during extreme floods
(Miller, Andrew J.) 7: 599

geomorphology—impact features
interpretation: Major circular structure beneath southern Lake Huron defined from potential field data
(Forsyth, D. A., *et al.*) 8: 773

geomorphology—lacustrine features
lakes: Thick and fast; sedimentation in a Pleistocene fiord lake of British Columbia, Canada
(Eyles, Nicholas, *et al.*) 11: 1153

geomorphology—landform description
benches: Debris-flow benches; dune-contact deposits record paleo-sand dune positions in North Panamint Valley, Inyo County, California
(Anderson, Suzanne Prestrud, *et al.*) 6: 524

geomorphology—landform evolution
mounds: Formation of Mima mounds; a seismic hypothesis
(Berg, Andrew W.) 3: 281
— Formation of Mima mounds; a seismic hypothesis; discussion
(Cox, G. W.) 12: 1259
— Formation of Mima mounds; a seismic hypothesis; reply
(Berg, Andrew W.) 12: 1260

geomorphology—processes
degradation: Dendrogeomorphic approach to estimating slope retreat, Maxey Flats, Kentucky
(Hupp, Cliff R., *et al.*) 7: 658
denudation: Black Mountains crustal section, Death Valley extended terrain, California
(Holm, Daniel K., *et al.*) 6: 520
erosion: Barrier-beach erosion and rising sea level
(Dubois, Roger N.) 11: 1150
— Channel trenching and climatic change in the Southern U.S. Great Plains; with Suppl. Data 90-09
(Hall, Stephen A.) 4: 342
— Late Holocene erosion and colluvium deposition in Swaziland
(Dardis, George F.) 10: 934
— Two-sided orogen; collision and erosion from the sandbox to the Southern Alps, New Zealand
(Koons, P. O.) 8: 679
sedimentation: Lithologic mixing in a modern foreland basin; evidence from Landsat thematic mapper images
(Damanti, John F.) 9: 835

geomorphology—solution features
caves: Glaciation and saline-freshwater mixing as a possible cause of cave formation in the eastern Midcontinent region of the United States; a conceptual model
(Panno, Samuel V., *et al.*) 8: 769

geomorphology—volcanic features
cinder cones: Geomorphic assessment of late Quaternary volcanism in the Yucca Mountain area, southern Nevada; implications for the proposed high-level radioactive waste repository
(Wells, S. G., *et al.*) 6: 549

geophysical methods—seismic methods
interpretation: Seismic anisotropy due to preferred mineral orientation observed in shallow crustal rocks in southern Alaska
(Brocher, Thomas M., *et al.*) 8: 737

geophysical surveys *see under* Africa; Alps; Argentina; Atlantic Ocean; British Columbia; Great Lakes region; Italy; Maine; Mauritania; New Zealand; Northwest Territories; Norway; Ohio; Ontario; Pacific Ocean; Quebec; Spitsbergen; Sweden; *see* acoustical surveys *under* geophysical surveys *under* Atlantic Ocean; Pacific Ocean; *see* magnetotelluric surveys *under* geophysical surveys *under* Atlantic Ocean; Mauritania; *see* seismic surveys *under* geophysical surveys *under* Africa; Atlantic Ocean; British Columbia; Maine; New Zealand; Northwest Territories; Norway; Ohio; Ontario; Pacific Ocean; Quebec; Sweden; *see* surveys *under* geophysical surveys *under* Alps; Atlantic Ocean; Great Lakes region; Northwest Territories; Pacific Ocean; *see also* geophysical methods

geophysics *see also* deformation

Georgia—structural geology
faults: Ocmulgee Fault; the Piedmont-Avalon terrane boundary in central Georgia
(Hooper, Robert J., *et al.*) 8: 708

geosynclines *see also* orogeny; tectonics

Germany *see also* West Germany

glacial geology *see also* geomorphology

glacial geology—glacial features
drumlins: Drumlins, subglacial meltwater floods, and ocean responses; discussion
(Kehew, Alan E., *et al.*) 5: 479
— Drumlins, subglacial meltwater floods, and ocean responses; discussion
(Forsstrom, Lars) 8: 804
— Drumlins, subglacial meltwater floods, and ocean responses; reply
(Shaw, John) 5: 480
— Drumlins, subglacial meltwater floods, and ocean responses; reply
(Shaw, John) 8: 804
— Evidence for large-scale subglacial meltwater flood events in southern Ontario and northern New York State
(Shaw, John, *et al.*) 12: 1169
till: Genetic till prism
(Hicock, Stephen R.) 6: 517

glacial geology—glaciation
deposition: Macrofabrics and quartz microstructures confirm glacial origin of Sunnybrook Drift in the Lake Ontario Basin
(Mahaney, William C.) 2: 145
— Macrofabrics and quartz microstructures confirm glacial origin of the Sunnybrook Drift in the Lake Ontario Basin; discussion
(Gomez, Basil) 10: 1032
— Macrofabrics and quartz microstructures confirm glacial origin of the Sunnybrook Drift in the Lake Ontario Basin; reply
(Mahaney, William C.) 10: 1033
effects: Sulfur isotope evidence for regional recharge of saline water during continental glaciation, north-central United States
(Siegel, D. I.) 11: 1054
solution features: Glaciation and saline-freshwater mixing as a possible cause of cave formation in the eastern Midcontinent region of the United States; a conceptual model
(Panno, Samuel V., *et al.*) 8: 769

glacial geology—glaciers
ice movement: Fast-flowing outlet glaciers on Svalbard ice caps
(Dowdeswell, Julian A., *et al.*) 8: 778

glaciation *see under* glacial geology

glaciers *see under* glacial geology

global tectonics *see* plate tectonics

gold ores *see also under* economic geology *under* Fiji; Malaysia; Nevada; New Mexico; Nova Scotia; Papua New Guinea; Philippine Islands; Solomon Islands; South Africa; Utah

gold ores—genesis
structural controls: Geodynamic setting of mesothermal gold deposits; an association with accretionary tectonic regimes
(Kerrich, Robert, *et al.*) 9: 882

Gondwana *see under* continental drift

grabens *see under* systems *under* faults

granites *see under* igneous rocks

granodiorites *see under* igneous rocks

Great Basin *see also* the individual states

Great Basin—geochemistry
neodymium: Nd isotopic gradients in upper crustal magma chambers; evidence for in situ magma–wall-rock interaction
(Tegtmeyer, K. J., *et al.*) 1: 5

Great Basin—geomorphology
volcanic features: Geomorphic assessment of late Quaternary volcanism in the Yucca Mountain area, southern Nevada; implications for the proposed high-level radioactive waste repository
(Wells, S. G., *et al.*) 6: 549

Great Basin—structural geology
tectonics: Late Paleozoic extension in the Great Basin, Western United States
(Smith, David Lee, *et al.*) 8: 712

Great Britain *see also* England; Scotland; Wales

Great Britain—oceanography
continental shelf: Reflections from mantle fault zones around the British Isles
(Flack, Catherine A., *et al.*) 6: 528

Great Lakes—geomorphology
impact features: Major circular structure beneath southern Lake Huron defined from potential field data
(Forsyth, D. A., *et al.*) 8: 773

Great Lakes region *see also* the individual states and provinces

Great Lakes region—geomorphology
glacial geology: Drumlins, subglacial meltwater floods, and ocean responses; discussion
(Kehew, Alan E., *et al.*) 5: 479
— Drumlins, subglacial meltwater floods, and ocean responses; reply
(Shaw, John) 5: 480
— Evidence for large-scale subglacial meltwater flood events in southern Ontario and northern New York State
(Shaw, John, *et al.*) 12: 1169

Great Lakes region—geophysical surveys
surveys: Major circular structure beneath southern Lake Huron defined from potential field data
(Forsyth, D. A., *et al.*) 8: 773

Great Lakes region—hydrogeology
ground water: Sulfur isotope evidence for regional recharge of saline water during continental glaciation, north-central United States
(Siegel, D. I.) 11: 1054

Great Lakes region—sedimentary petrology
sedimentation: Macrofabrics and quartz microstructures confirm glacial origin of Sunnybrook Drift in the Lake Ontario Basin
(Mahaney, William C.) 2: 145
— Macrofabrics and quartz microstructures confirm glacial origin of the Sunnybrook Drift in the Lake Ontario Basin; discussion
(Gomez, Basil) 10: 1032
— Macrofabrics and quartz microstructures confirm glacial origin of the Sunnybrook Drift in the Lake Ontario Basin; reply
(Mahaney, William C.) 10: 1033

Great Lakes region—structural geology
tectonics: Early history of the Michigan Basin; subsidence and Appalachian tectonics
(Howell, Paul D., *et al.*) 12: 1195

Great Plains *see also* the individual states and provinces

Great Plains—stratigraphy
Holocene: Channel trenching and climatic change in the Southern U.S. Great Plains; with Suppl. Data 90-09
(Hall, Stephen A.) 4: 342

Greece—structural geology
neotectonics: Geologic history of the extensional basin of the Gulf of Corinth (?Miocene-Pleistocene), Greece; discussion
(Doutsos, Theodor, *et al.*) 12: 1256
— Geologic history of the extensional basin of the Gulf of Corinth (?Miocene-Pleistocene), Greece; reply
(Ori, Gian Gabriele) 12: 1256
— Mechanisms of blueschist creation and preservation in an A-type subduction zone, Mount Olympos region, Greece
(Schermer, Elizabeth R.) 11: 1130

Greenland—sedimentary petrology
sedimentary structures: Sand-drift surfaces; a neglected type of bounding surface
(Clemmensen, Lars B., *et al.*) 11: 1142

ground water *see also* hydrology

ground water—geochemistry
noble gases: Noble gas and methane partitioning from ground water; an aid to natural gas exploration and reservoir evaluation
(Zaikowski, Anthony, *et al.*) 1: 72

ground water—surveys
Bahamas: Active circulation of saline ground waters in carbonate platforms; evidence from the Great Bahama Bank
(Whitaker, F. F., *et al.*) 3: 200
France: Origin of the oil-field brines in the Paris Basin
(Matray, Jean-Michel, *et al.*) 6: 501
Great Lakes region: Sulfur isotope evidence for regional recharge of saline water during continental glaciation, north-central United States
(Siegel, D. I.) 11: 1054
Yucatan Aquifer: Geologic and environmental aspects of surface cementation, north coast, Yucatan, Mexico; discussion
(Smart, P. L., *et al.*) 8: 802
— Geologic and environmental aspects of surface cementation, north coast, Yucatan, Mexico; reply
(Perry, Eugene, *et al.*) 8: 803

Gulf Coastal Plain *see also* the individual states and countries

Gulf Coastal Plain—structural geology
salt tectonics: Evidence for episodic basin dewatering in salt-dome cap rocks
(Hallager, W. S., *et al.*) 8: 716

Gulf Coastal Plain—tectonophysics
crust: Gulf Coast-East Coast magnetic anomaly; I, Root of the main crustal decollement for the Appalachian-Ouachita Orogen
(Hall, David J.) 9: 862

Hawaii—volcanology
Mahukona: Mahukona; the missing Hawaiian volcano
(Garcia, Michael O., *et al.*) 11: 1111
Mauna Loa: Implications of historical eruptive-vent migration on the northeast rift zone of Mauna Loa Volcano, Hawaii
(Lockwood, John P.) 7: 611

heat flow *see also under* tectonophysics *under* Taiwan

heavy minerals *see also* titanium

helium—isotopes
He-4/He-3: Mahukona; the missing Hawaiian volcano
(Garcia, Michael O., *et al.*) 11: 1111

Himalayas *see also* the individual countries

Himalayas—structural geology
neotectonics: Episodic rapid uplift in the Himalaya revealed by $^{40}Ar/^{39}Ar$ analysis of detrital K-feldspar and muscovite, Bengal Fan
(Copeland, Peter, *et al.*) 4: 354

Himalayas—tectonophysics
plate tectonics: Precollision and postcollision thermal events in the Himalaya
(Johnson, M. R. W., *et al.*) 8: 753

Holocene *see also under* geochronology *under* Indian Ocean Islands; Oklahoma; Peru; Swaziland; Texas; *see also under* stratigraphy *under* Bahamas; Great Plains; Mauritania; Mexico; Quebec; Sahara

hydrocarbons *see under* organic materials

hydrogeology *see also* ground water; hydrology

hydrology *see also* ground water

hydrology—limnology
sedimentation: Cyanobacterial precipitation of gypsum, calcite, and magnesite from natural alkaline lake water
(Thompson, J. B., *et al.*) 10: 995

hydrology—surveys
Appalachians: Fluvial response to debris associated with mass wasting during extreme floods
(Miller, Andrew J.) 7: 599
East African Lakes: Development of coarse-grained facies in lacustrine rift basins; examples from East Africa
(Scholz, Christopher A., *et al.*) 2: 140

hydrothermal alteration *see under* processes *under* metasomatism

hydrothermal processes *see under* gold ores *under* mineral deposits, genesis

Iberian Peninsula *see also* Spain

ice ages *see* glacial geology

ichnofossils—biostratigraphy
Cambrian: Stratigraphic significance of Cruziana; new data concerning the Cambrian-Ordovician ichnostratigraphic paradigm
(Magwood, James P. A., *et al.*) 8: 729

ichnofossils—paleoecology
Tertiary: Doomed pioneers; gravity-flow deposition and bioturbation in marine oxygen-deficient environments
(Follmi, Karl B., *et al.*) 11: 1069

Idaho—geochronology
Cretaceous: Late Cretaceous extension in the hinterland of the Sevier thrust belt, northwestern Utah and southern Idaho; with Suppl. Data 90-20
(Wells, Michael L., *et al.*) 10: 929

Idaho—structural geology
neotectonics: Northeastern Basin and Range Province active tectonics; an alternative view; discussion
(Anders, Mark H., *et al.*) 9: 914
— Northeastern Basin and Range Province active tectonics; an alternative view; reply
(Westaway, Rob) 9: 915
structural analysis: Direction and shear sense during suturing of the Seven Devils-Wallowa Terrane against North America in western Idaho; discussion
(Lund, Karen, *et al.*) 10: 1031
— Direction and shear sense during suturing of the Seven Devils-Wallowa Terrane against North America in western Idaho; reply
(Strayer, Luther M., IV, *et al.*) 10: 1031
tectonics: Late Cretaceous extension in the hinterland of the Sevier thrust belt, northwestern Utah and southern Idaho; with Suppl. Data 90-20
(Wells, Michael L., *et al.*) 10: 929

Idaho—tectonophysics
crust: Extension of the Yellowstone Plateau, eastern Snake River plain, and Owyhee Plateau; with Suppl. Data 90-28
(Rodgers, David W., *et al.*) 11: 1138

igneous rocks *see also* fluid inclusions; inclusions; intrusions; lava; magmas; metamorphic rocks; metasomatism; phase equilibria

igneous rocks—basalts
genesis: Modified Gulf of California model for South Georgia, North Scotia Ridge, and implications for the Rocas Verdes back-arc basin, Southern Andes
(Alabaster, T., *et al.*) 6: 497
geochemistry: Mantle plumes and flood-basalt stratigraphy in the Parana, South America
(Peate, David W., *et al.*) 12: 1223

igneous rocks—carbonatites
physicochemical properties: Physicochemical properties of alkali carbonatite lavas; data from the 1988 eruption of Oldoinyo Lengai, Tanzania
(Dawson, J. B., *et al.*) 3: 260

igneous rocks—diorites
geochemistry: Rapid uplift and crustal growth in extensional environments; an isotopic study from the Death Valley region, California
(Asmerom, Yemane, *et al.*) 3: 223
tonalite: Petrogenetic and tectonic significance of xenocrystic Precambrian zircon in Lower Cambrian tonalite, eastern Klamath Mountains, California
(Wallin, E. T.) 11: 1057

igneous rocks—gabbros
distribution: Alpine Jurassic ophiolites resemble the modern central Atlantic basement
(Lagabrielle, Yves, *et al.*) 4: 319

igneous rocks—genesis
magmas: U-Pb and Sm-Nd ages for the Stillwater Complex and its associated sills and dikes, Beartooth Mountains, Montana; identification of a parent magma?; with Suppl. Data 90-26
(Premo, W. R., *et al.*) 11: 1065

igneous rocks—geochemistry
trace elements: Intraplate-type magmatism in a continent–island-arc collision zone; Porgera intrusive complex, Papua New Guinea
(Richards, Jeremy P., *et al.*) 10: 958
— Mid-Proterozoic lamprophyre commingled with late-stage granitic dikes of the anorogenic San Isabel Batholith, Wet Mountains, Colorado
(Noblett, Jeffrey B., *et al.*) 2: 120

igneous rocks—granites
genesis: Geochronologic and isotopic evidence for involvement of pre-Pan-African crust in the Nubian Shield, Egypt
(Sultan, Mohamed, *et al.*) 8: 761
— Nested granites in question; contrasted emplacement kinematics of independent magmas in the Zaer Pluton, Morocco
(Bouchez, Jean Luc, *et al.*) 10: 966
— Northern Monashee Mountains, Omineca crystalline belt, British Columbia; timing of metamorphism, anatexis, and tectonic denudation; with Suppl. Data 90-06
(Sevigny, J. H., *et al.*) 2: 103
geochemistry: Sulfur isotopic ratios of the magnetite-series and ilmenite-series granitoids of the Sierra Nevada Batholith; a reconnaissance study; discussion
(Zheng, Y. F.) 7: 671
— Sulfur isotopic ratios of the magnetite-series and ilmenite-series granitoids of the Sierra Nevada Batholith; a reconnaissance study; reply
(Ishihara, Shunso, *et al.*) 7: 672

igneous rocks—granodiorites
distribution: I-type granitoids as indicators of a late Paleozoic convergent ocean-continent margin along the southern flank of the central European Variscan Orogen
(Finger, F., *et al.*) 12: 1207

igneous rocks—hypabyssal rocks
genesis: Middle Eocene dike swarms and their relation to contemporaneous plutonism, volcanism, core-complex mylonitization, and graben subsidence, Okanogan Highlands, Washington; with Suppl. Data 90-27
(Holder, Grace A. McCarley, *et al.*) 11: 1082

igneous rocks—lamprophyres
lamproite: Stratigraphic control of the Hills Pond Lamproite, Silver City Dome, southeastern Kansas
(Wojcik, Krzysztof M., *et al.*) 3: 251

igneous rocks—peridotites
phase equilibria: Solidus of carbonated fertile peridotite under fluid-saturated conditions
(Falloon, Trevor J., *et al.*) 3: 195

igneous rocks—plutonic rocks
genesis: Proterozoic subduction and terrane amalgamation in the southwestern Grenville Province, Canada; evidence from ultrapotassic to shoshonitic plutonism
(Corriveau, Louise) 7: 614

igneous rocks—pyroclastics
ash-flow tuff: Nd isotopic gradients in upper crustal magma chambers; evidence for in situ magma–wall-rock interaction
(Tegtmeyer, K. J., *et al.*) 1: 5

igneous rocks—rhyolites
geochemistry: Oxygen isotope geochemistry of the silicic volcanic rocks of the Etendeka-Parana Province; source constraints
(Harris, Chris, *et al.*) 11: 1119

igneous rocks—textures
fabric: Tectonic control on the origin and orientation of igneous layering; an example from the Greendale Complex, Antigonish Highlands, Nova Scotia, Canada
(Murphy, J. Brendan, *et al.*) 5: 403

igneous rocks—ultramafics
ophiolite: Discrimination of ophiolitic from nonophiolitic ultramafic-mafic allochthons in orogenic belts by the Al/Ti ratio in clinopyroxene
(Loucks, Robert R.) 4: 346
— Implications of new Jurassic stratigraphic, geochronometric, and paleolatitudinal data from the western Klamath Terrane (Smith River and Rogue Valley subterranes)
(Pessagno, Emile A., Jr., *et al.*) 7: 665
— Nature of ophiolite occurrences along the eastern margin of the Indian Plate and their tectonic significance
(Sengupta, S., *et al.*) 5: 439

igneous rocks—volcanic rocks
genesis: Intra-arc extension and magmatic evolution in the central Aleutian arc, Alaska
(Singer, Bradley S., *et al.*) 11: 1050
geochemistry: Chemistry of seamounts near the East Pacific Rise; implications for the geometry of subaxial mantle flow
(Batiza, Rodey, *et al.*) 11: 1122
— Geochemistry of high-potassium rocks from the mid-Tertiary Guffey volcanic center, Thirtynine Mile volcanic field, central Colorado; with Suppl. Data 90-15
(Wobus, Reinhard A., *et al.*) 7: 642
— Mahukona; the missing Hawaiian volcano
(Garcia, Michael O., *et al.*) 11: 1111
— Mantle sources in the Arizona transition zone and global mantle heterogeneity
(Cooper, Jeanne L., *et al.*) 11: 1146
— Nd- and Pb-isotope variations in the multicyclic central caldera cluster of the San Juan volcanic field, Colorado, and implications for crustal hybridization
(Riciputi, Lee R., *et al.*) 10: 975

Illinois—geochemistry
bromine: Br-Cl-Na systematics in Illinois Basin fluids; constraints on fluid origin and evolution
(Walter, Lynn M., *et al.*) 4: 315

Illinois—geomorphology
solution features: Glaciation and saline-freshwater mixing as a possible cause of cave formation in the eastern Midcontinent region of the United States; a conceptual model
(Panno, Samuel V., *et al.*) 8: 769

Illinois—hydrogeology
ground water: Sulfur isotope evidence for regional recharge of saline water during continental glaciation, north-central United States
(Siegel, D. I.) 11: 1054

impact features *see under* geomorphology

incertae sedis *see* problematic fossils

inclusions *see also* fluid inclusions

inclusions—xenoliths
breccia: Use of reaction space in depicting polymetamorphic histories
(Schneiderman, Jill S.) 4: 350
kimberlite: Experimental study bearing on the absence of carbonate in mantle-derived xenoliths
(Canil, Dante) 10: 1011
spinel peridotite: Shear zones in the upper mantle; relationship between geochemical enrichment and deformation in mantle peridotites
(Downes, H.) 4: 374

India—stratigraphy
Cretaceous: Paleontological view of the ages of the Deccan Traps, the Cretaceous/Tertiary boundary, and the India-Asia collision; discussion
(Thewissen, J. G. M.) 2: 185
— Paleontological view of the ages of the Deccan Traps, the Cretaceous/Tertiary boundary, and the India-Asia collision; discussion
(Buffetaut, Eric) 2: 186
— Paleontological view of the ages of the Deccan Traps, the Cretaceous/Tertiary boundary, and the India-Asia collision; reply
(Jaeger, J. J., *et al.*) 2: 186
Paleocene: Paleontological view of the ages of the Deccan Traps, the Cretaceous/Tertiary boundary, and the India-Asia collision; discussion
(Thewissen, J. G. M.) 2: 185
— Paleontological view of the ages of the Deccan Traps, the Cretaceous/Tertiary boundary, and the India-Asia collision; discussion
(Buffetaut, Eric) 2: 186
— Paleontological view of the ages of the Deccan Traps, the Cretaceous/Tertiary boundary, and the India-Asia collision; reply
(Jaeger, J. J., *et al.*) 2: 186

India—tectonophysics
plate tectonics: Nature of ophiolite occurrences along the eastern margin of the Indian Plate and their tectonic significance
(Sengupta, S., *et al.*) 5: 439

Indian Ocean *see also* Persian Gulf; Red Sea

Indian Ocean—oceanography
reefs: Sea level and coral atolls; late Holocene emergence in the Indian Ocean
(Woodroffe, Colin, *et al.*) 1: 62
sediments: Episodic rapid uplift in the Himalaya revealed by $^{40}Ar/^{39}Ar$ analysis of detrital K-feldspar and muscovite, Bengal Fan
(Copeland, Peter, *et al.*) 4: 354

Indian Ocean Islands—geochronology
Holocene: Sea level and coral atolls; late Holocene emergence in the Indian Ocean
(Woodroffe, Colin, *et al.*) 1: 62

Indian Ocean Islands—geomorphology
changes of level: Sea level and coral atolls; late Holocene emergence in the Indian Ocean
(Woodroffe, Colin, *et al.*) 1: 62

Indonesia—sedimentary petrology
diagenesis: Dolomite formation in anoxic sediments of Kau Bay, Indonesia
(Middelburg, Jack J., *et al.*) 5: 399

Indonesia—tectonophysics
plate tectonics: Nature of ophiolite occurrences along the eastern margin of the Indian Plate and their tectonic significance
(Sengupta, S., *et al.*) 5: 439

inert gases *see* noble gases

intrusions *see also* igneous rocks; metamorphism; metasomatism

intrusions—age
absolute age: U-Pb and Sm-Nd ages for the Stillwater Complex and its associated sills and dikes, Beartooth Mountains, Montana; identification of a parent magma?; with Suppl. Data 90-26
(Premo, W. R., *et al.*) 11: 1065

intrusions—batholiths
distribution: Cenozoic thrust emplacement of a Devonian batholith, northeastern Brooks Range; involvement of crystalline rocks in a foreland fold-and-thrust belt
(Hanks, Catherine L., *et al.*) 5: 395
emplacement: Discordant paleomagnetic poles from the Canadian Coast Plutonic Complex; regional tilt rather than large displacement?; discussion
(Miller, Robert B., *et al.*) 11: 1164
— Discordant paleomagnetic poles from the Canadian Coast Plutonic Complex; regional tilt rather than large displacement?; reply
(Butler, R. F., *et al.*) 11: 1165
— Late Cretaceous age of fractures in the Sierra Nevada Batholith, California
(Segall, Paul, *et al.*) 12: 1248
geochemistry: Sulfur isotopic ratios of the magnetite-series and ilmenite-series granitoids of the Sierra Nevada Batholith; a reconnaissance study; discussion
(Zheng, Y. F.) 7: 671
— Sulfur isotopic ratios of the magnetite-series and ilmenite-series granitoids of the Sierra Nevada Batholith; a reconnaissance study; reply
(Ishihara, Shunso, *et al.*) 7: 672

intrusions—dikes
composition: Mid-Proterozoic lamprophyre commingled with late-stage granitic dikes of the anorogenic San Isabel Batholith, Wet Mountains, Colorado
(Noblett, Jeffrey B., *et al.*) 2: 120
dike swarms: Middle Eocene dike swarms and their relation to contemporaneous plutonism, volcanism, core-complex mylonitization, and graben subsidence, Okanogan Highlands, Washington; with Suppl. Data 90-27
(Holder, Grace A. McCarley, *et al.*) 11: 1082
emplacement: Why dikes?
(Emerman, Steven H., *et al.*) 3: 231

intrusions—emplacement
plate collision: Intraplate-type magmatism in a continent–island-arc collision zone; Porgera intrusive complex, Papua New Guinea
(Richards, Jeremy P., *et al.*) 10: 958

intrusions—layered intrusions
emplacement: Tectonic control on the origin and orientation of igneous layering; an example from the Greendale Complex, Antigonish Highlands, Nova Scotia, Canada
(Murphy, J. Brendan, *et al.*) 5: 403

intrusions—plutons
absolute age: Tectonic significance of Silurian magmatism in the Canadian Appalachians
(Bevier, Mary Lou, *et al.*) 5: 411
— Timing and kinematics of deformation in the Cronese Hills, California, and implications for Mesozoic structure of the southwestern Cordillera
(Walker, J. Douglas, *et al.*) 6: 554
contact metamorphism: Crystal size of epidotes; a potentially exploitable geothermometer in geothermal fields?
(Patrier, Patricia, *et al.*) 11: 1126
emplacement: Constraints on Alleghanian vertical displacements in the southern Appalachian Piedmont, based on aluminum-in-hornblende barometry
(Vyhnal, Christopher R., *et al.*) 10: 938
— Direction and shear sense during suturing of the Seven Devils-Wallowa Terrane against North America in western Idaho; discussion
(Lund, Karen, *et al.*) 10: 1031
— Direction and shear sense during suturing of the Seven Devils-Wallowa Terrane against North America in western Idaho; reply
(Strayer, Luther M., IV, *et al.*) 10: 1031
— I-type granitoids as indicators of a late Paleozoic convergent ocean-continent margin along the southern flank of the central European Variscan Orogen
(Finger, F., *et al.*) 12: 1207
— Intra-arc strike-slip fault exposed at batholithic levels in the southern Sierra Nevada, California
(Busby-Spera, Cathy J., *et al.*) 3: 255
— Nested granites in question; contrasted emplacement kinematics of independent magmas in the Zaer Pluton, Morocco
(Bouchez, Jean Luc, *et al.*) 10: 966
— Proterozoic subduction and terrane amalgamation in the southwestern Grenville Province, Canada; evidence from ultrapotassic to shoshonitic plutonism
(Corriveau, Louise) 7: 614

intrusions—sills
age: U/Pb zircon and baddeleyite ages for the Palisades and Gettysburg sills of the northeastern United States; implications for the age of the Triassic/Jurassic boundary
(Dunning, G. R., *et al.*) 8: 795
distribution: Deformation of the Baltic continental crust during Caledonide intracontinental subduction; views from seismic reflection data; discussion
(Hauser, Ernest C.) 6: 578
— Deformation of the Baltic continental crust during Caledonide intracontinental subduction; views from seismic reflection data; reply
(Hurich, C. A., *et al.*) 6: 579
emplacement: Palisades Sill; origin of the olivine zone by separate magmatic injection rather than gravity settling
(Husch, Jonathan M.) 8: 699
— Stratigraphic control of the Hills Pond Lamproite, Silver City Dome, southeastern Kansas
(Wojcik, Krzysztof M., *et al.*) 3: 251

Invertebrata *see also* ichnofossils; problematic fossils; worms

invertebrates *see also* conodonts; foraminifers; mollusks; ostracods; radiolarians

invertebrates—biostratigraphy
Paleozoic: Paleontological evidence of Paleozoic age for the Walden Creek Group, Ocoee Supergroup, Tennessee
(Unrug, Raphael, *et al.*) 11: 1041

invertebrates—paleoecology
Eocene: Eocene deep-sea communities in localized limestones formed by subduction-related methane seeps, southwestern Washington
(Goedert, James L., *et al.*) 12: 1182

Ionian Sea—oceanography
sedimentation: Geologic history of the extensional basin of the Gulf of Corinth (?Miocene-Pleistocene), Greece; discussion
(Doutsos, Theodor, *et al.*) 12: 1256
— Geologic history of the extensional basin of the Gulf of Corinth (?Miocene-Pleistocene), Greece; reply
(Ori, Gian Gabriele) 12: 1256

iridium—geochemistry
clay: Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; discussion
(Kyte, Frank T.) 1: 87
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; discussion
(Bohor, Bruce F.) 1: 88
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; reply
(Schmitz, Birger) 1: 89
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; discussion
(Triplehorn, D. M.) 1: 92
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; reply
(Schmitz, Birger) 1: 93
claystone: Paleosols and the Cretaceous/Tertiary transition in the Big Bend region of Texas
(Lehman, Thomas M.) 4: 362
shale: Acraman impact ejecta and host shales; evidence for low-temperature mobilization of iridium and other platinoids
(Wallace, Malcolm W., *et al.*) 2: 132

iron—geochemistry
sediments: Fe(III)-reducing bacteria in deeply buried sediments of the Atlantic Coastal Plain
(Lovley, Derek R., *et al.*) 10: 954

isostasy *see also* changes of level; neotectonics; *see also under* structural geology *under* New England

isotope dating *see* absolute age

isotopes *see also* absolute age; geochronology

isotopes—brines
stable isotopes: Origin of the oil-field brines in the Paris Basin
(Matray, Jean-Michel, *et al.*) 6: 501

isotopes—carbon
C-13/C-12: Carbon dioxide in clastic rocks and silicate hydrolysis
(Hutcheon, Ian, *et al.*) 6: 541
— Extreme ^{13}C depletions in seawater-derived brines and their implications for the past geochemical carbon cycle
(Lazar, Boaz, *et al.*) 12: 1191
— Phosphogenesis and weathering of shelf sediments from the Southeastern United States; implications for Miocene $\delta^{13}C$ excursions and global cooling
(Compton, John S., *et al.*) 12: 1227
— Stable-isotope record of organic carbon from an evolving carbonate banktop, Bight of Abaco, Bahamas
(Rasmussen, Kenneth A., *et al.*) 8: 790

isotopes—foraminifers
stable isotopes: Stable isotope evidence for foraminiferal habitats during the development of the Cenomanian/Turonian oceanic anoxic event; with Suppl. Data 90-07
(Corfield, R. M., *et al.*) 2: 175

isotopes—igneous rocks
diorites: Rapid uplift and crustal growth in extensional environments; an isotopic study from the Death Valley region, California
(Asmerom, Yemane, *et al.*) 3: 223
granites: Geochronologic and isotopic evidence for involvement of pre-Pan-African crust in the Nubian Shield, Egypt
(Sultan, Mohamed, *et al.*) 8: 761
volcanic rocks: Mahukona; the missing Hawaiian volcano
(Garcia, Michael O., *et al.*) 11: 1111
— Mantle sources in the Arizona transition zone and global mantle heterogeneity
(Cooper, Jeanne L., *et al.*) 11: 1146
— Nd- and Pb-isotope variations in the multicyclic central caldera cluster of the San Juan volcanic field, Colorado, and implications for crustal hybridization
(Riciputi, Lee R., *et al.*) 10: 975

isotopes—inclusions
xenoliths: Shear zones in the upper mantle; relationship between geochemical enrichment and deformation in mantle peridotites
(Downes, H.) 4: 374

isotopes—minerals
calcite: Intracrystalline carbon and oxygen isotope variations in calcite revealed by laser microsampling
(Dickson, J. A. D., *et al.*) 9: 809

isotopes—mollusks
shells: High-paleolatitude Late Cretaceous paleotemperatures; new data from James Ross Island, Antarctica
(Pirrie, D., *et al.*) 1: 31

isotopes—neodymium
Nd-144/Nd-143: Modified Gulf of California model for South Georgia, North Scotia Ridge, and implications for the Rocas Verdes back-arc basin, Southern Andes
(Alabaster, T., *et al.*) 6: 497
— Nd isotopic gradients in upper crustal magma chambers; evidence for in situ magma–wall-rock interaction
(Tegtmeyer, K. J., *et al.*) 1: 5

isotopes—oxygen
O-18/O-16: Oxygen isotope geochemistry of the silicic volcanic rocks of the Etendeka-Parana Province; source constraints
(Harris, Chris, *et al.*) 11: 1119

isotopes—sedimentary rocks
carbonate rocks: Did major changes in the stable-isotope composition of Proterozoic seawater occur?
(Burdett, J. W., *et al.*) 3: 227
limestone: Channelized fluid flow through shear zones during fluid-enhanced dynamic recrystallization, Northern Apennines, Italy
(Carter, Karen E., *et al.*) 8: 720
— Hydrothermal dolomitization of Jurassic-Cretaceous limestones in the Southern Alps (Italy); relation to tectonics and volcanism
(Cervato, Cinzia) 5: 458
sandstone: Linear coupling of carbon and strontium isotopes in Rotliegend Sandstone, North Sea; evidence for cross-formational fluid flow
(Sullivan, Morgan D., *et al.*) 12: 1215

isotopes—sediments
marine sediments: Dolomite formation in anoxic sediments of Kau Bay, Indonesia
(Middelburg, Jack J., *et al.*) 5: 399
— Response of Th/U in deep Labrador Sea sediments (ODP Site 646) to changes in sedimentation rates and paleoproductivities
(Hillaire-Marcel, C., *et al.*) 2: 162

isotopes—strontium
Sr-87/Sr-86: Abu Dhabi Sabkha, Persian Gulf, revisited; application of strontium isotopes to test an early dolomitization model
(Muller, Daniel W., *et al.*) 7: 618
— Intra-arc extension and magmatic evolution in the central Aleutian arc, Alaska
(Singer, Bradley S., *et al.*) 11: 1050
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; discussion
(Kyte, Frank T.) 1: 87
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; reply
(Schmitz, Birger) 1: 89

isotopes—sulfur
S-34/S-32: Sulfur isotope evidence for regional recharge of saline water during continental glaciation, north-central United States
(Siegel, D. I.) 11: 1054
— Sulfur isotopic ratios of the magnetite-series and ilmenite-series granitoids of the Sierra Nevada Batholith; a reconnaissance study; discussion
(Zheng, Y. F.) 7: 671
— Sulfur isotopic ratios of the magnetite-series and ilmenite-series granitoids of the Sierra Nevada Batholith; a reconnaissance study; reply
(Ishihara, Shunso, *et al.*) 7: 672
— Timing of mississippi valley-type mineralization; relation to Appalachian orogenic events
(Kesler, Stephen E., *et al.*) 11: 1115

Israel—geochemistry
sea water: Extreme ^{13}C depletions in seawater-derived brines and their implications for the past geochemical carbon cycle
(Lazar, Boaz, *et al.*) 12: 1191

Israel—geochronology
Proterozoic: Early Pan-African evolution of the basement around Elat, Israel, and the Sinai Peninsula revealed by single-zircon evaporation dating, and implications for crustal accretion rates
(Kroner, A., *et al.*) 6: 545

Italy—geochronology
absolute age: $^{40}Ar/^{39}Ar$ laser-probe dating by step heating and spot fusion of phengites from the Dora Maira nappe of the Western Alps, Italy
(Scaillet, S., *et al.*) 8: 741

Italy—geophysical surveys
remote sensing: Thermal radiance observations of an active lava flow during the June 1984 eruption of Mount Etna
(Pieri, David C., *et al.*) 10: 1018

Italy—sedimentary petrology
diagenesis: Hydrothermal dolomitization of Jurassic-Cretaceous limestones in the Southern Alps (Italy); relation to tectonics and volcanism
(Cervato, Cinzia) 5: 458

Italy—structural geology
deformation: Channelized fluid flow through shear zones during fluid-enhanced dynamic recrystallization, Northern Apennines, Italy
(Carter, Karen E., *et al.*) 8: 720
faults: Pattern of extensional faulting in pelagic carbonates of the Umbria-Marche Apennines of central Italy
(Alvarez, Walter) 5: 407

Japan—sedimentary petrology
sedimentary structures: Slump strain indicative of paleoslope in Cretaceous Izumi sedimentary basin along Median Tectonic Line, Southwest Japan
(Miyata, Takao) 5: 392

Japan—tectonophysics
plate tectonics: Alternative plate model for the early Miocene evolution of the Southwest Japan margin
(Hibbard, J. P., *et al.*) 2: 170

joints *see under* style *under* fractures

Jurassic *see also under* geochronology *under* New Jersey; Pennsylvania; *see also under* stratigraphy *under* California; Colorado Plateau; Oregon

Kansas—petrology
intrusions: Stratigraphic control of the Hills Pond Lamproite, Silver City Dome, southeastern Kansas
(Wojcik, Krzysztof M., *et al.*) 3: 251

Kansas—stratigraphy
Permian: Permian chronostratigraphy in Kansas
(Baars, D. L.) 8: 687

Kentucky—geomorphology
processes: Dendrogeomorphic approach to estimating slope retreat, Maxey Flats, Kentucky
(Hupp, Cliff R., *et al.*) 7: 658

Kenya—structural geology
neotectonics: Rotation of extension direction in the central Kenya Rift
(Strecker, M. R., *et al.*) 4: 299

lacustrine features *see under* geomorphology

lakes *see under* lacustrine features *under* geomorphology

lamprophyres *see under* igneous rocks

landform description *see under* geomorphology

landform evolution *see under* geomorphology

lava *see also* igneous rocks; magmas

lava—composition
chemical composition: Chemistry of seamounts near the East Pacific Rise; implications for the geometry of subaxial mantle flow
(Batiza, Rodey, *et al.*) 11: 1122

lava—distribution
lava flows: Implications of historical eruptive-vent migration on the northeast rift zone of Mauna Loa Volcano, Hawaii
(Lockwood, John P.) 7: 611
— Regional significance of recurrent faulting and intracanyon volcanism at Oak Creek canyon, southern Colorado Plateau, Arizona; with Suppl. Data 90-23
(Holm, Richard F., *et al.*) 10: 1014

lava—flow mechanism
rheology: Physicochemical properties of alkali carbonatite lavas; data from the 1988 eruption of Oldoinyo Lengai, Tanzania
(Dawson, J. B., *et al.*) 3: 260

lava—geochemistry
isotopes: Mahukona; the missing Hawaiian volcano
(Garcia, Michael O., *et al.*) 11: 1111
— Nd- and Pb-isotope variations in the multicyclic central caldera cluster of the San Juan volcanic field, Colorado, and implications for crustal hybridization
(Riciputi, Lee R., *et al.*) 10: 975
— Oxygen isotope geochemistry of the silicic volcanic rocks of the Etendeka-Parana Province; source constraints
(Harris, Chris, *et al.*) 11: 1119
trace elements: Geochemistry of high-potassium rocks from the mid-Tertiary Guffey volcanic center, Thirtynine Mile volcanic field, central Colorado; with Suppl. Data 90-15
(Wobus, Reinhard A., *et al.*) 7: 642
— Mantle sources in the Arizona transition zone and global mantle heterogeneity
(Cooper, Jeanne L., *et al.*) 11: 1146

lava—temperature
observations: Thermal radiance observations of an active lava flow during the June 1984 eruption of Mount Etna
(Pieri, David C., *et al.*) 10: 1018

lead—isotopes
igneous rocks: Intraplate-type magmatism in a continent–island-arc collision zone; Porgera intrusive complex, Papua New Guinea
(Richards, Jeremy P., *et al.*) 10: 958
lava: Mantle sources in the Arizona transition zone and global mantle heterogeneity
(Cooper, Jeanne L., *et al.*) 11: 1146
Pb-206/Pb-204: Nd- and Pb-isotope variations in the multicyclic central caldera cluster of the San Juan volcanic field, Colorado, and implications for crustal hybridization
(Riciputi, Lee R., *et al.*) 10: 975

lead-zinc deposits *see also under* economic geology *under* Appalachians; Missouri

lead-zinc deposits—genesis
controls: Integrated tectonic-genetic model for volcanic-hosted massive sulfide deposits
(Sawkins, Frederick J.) 11: 1061

Levant *see* Middle East

limestone *see also under* carbonate rocks *under* sedimentary rocks

limnology *see under* hydrology

lineation *see also* foliation; structural analysis

liquid inclusions *see* fluid inclusions

loess *see under* clastic sediments *under* sediments; *see under* tephrochronology *under* geochronology

Louisiana—sedimentary petrology
diagenesis: Evidence for episodic basin dewatering in salt-dome cap rocks
(Hallager, W. S., *et al.*) 8: 716

lunar studies *see* Moon

magmas *see also* igneous rocks; intrusions; lava

magmas—evolution
island arcs: Intra-arc extension and magmatic evolution in the central Aleutian arc, Alaska
(Singer, Bradley S., *et al.*) 11: 1050
magma chambers: New structural limits on magma chamber locations at the Valley of Ten Thousand Smokes, Katmai National Park, Alaska
(Wallmann, Peter C., *et al.*) 12: 1240
mid-ocean ridges: Chemistry of seamounts near the East Pacific Rise; implications for the geometry of subaxial mantle flow
(Batiza, Rodey, *et al.*) 11: 1122
orogenic belts: Tectonic significance of Silurian magmatism in the Canadian Appalachians
(Bevier, Mary Lou, *et al.*) 5: 411
periodicity: Nested granites in question; contrasted emplacement kinematics of independent magmas in the Zaer Pluton, Morocco
(Bouchez, Jean Luc, *et al.*) 10: 966
plumes: Mahukona; the missing Hawaiian volcano
(Garcia, Michael O., *et al.*) 11: 1111
— Mantle plumes and flood-basalt stratigraphy in the Parana, South America
(Peate, David W., *et al.*) 12: 1223
sills: Palisades Sill; origin of the olivine zone by separate magmatic injection rather than gravity settling
(Husch, Jonathan M.) 8: 699

magmas—genesis
back-arc basins: Modified Gulf of California model for South Georgia, North Scotia Ridge, and implications for the Rocas Verdes back-arc basin, Southern Andes
(Alabaster, T., *et al.*) 6: 497
layered intrusions: U-Pb and Sm-Nd ages for the Stillwater Complex and its associated sills and dikes, Beartooth Mountains, Montana; identification of a parent magma?; with Suppl. Data 90-26
(Premo, W. R., *et al.*) 11: 1065
partial melting: Generating melt during lithospheric extension; pure shear vs. simple shear
(Latin, Dave, *et al.*) 4: 327
plate collision: Intraplate-type magmatism in a continent–island-arc collision zone; Porgera intrusive complex, Papua New Guinea
(Richards, Jeremy P., *et al.*) 10: 958
transition zones: Mantle sources in the Arizona transition zone and global mantle heterogeneity
(Cooper, Jeanne L., *et al.*) 11: 1146

magmas—geochemistry
dissociation: Experimental study bearing on the absence of carbonate in mantle-derived xenoliths
(Canil, Dante) 10: 1011
neodymium: Nd isotopic gradients in upper crustal magma chambers; evidence for in situ magma–wall-rock interaction
(Tegtmeyer, K. J., *et al.*) 1: 5

magmas—viscosity
effects: Why dikes?
(Emerman, Steven H., *et al.*) 3: 231
lava: Physicochemical properties of alkali carbonatite lavas; data from the 1988 eruption of Oldoinyo Lengai, Tanzania
(Dawson, J. B., *et al.*) 3: 260

magnesium—geochemistry
ostracods: Magnesium-salinity relation in the saline lake ostracode Cyprideis americana
(Teeter, James W., *et al.*) 3: 220

magnetism of rocks and minerals *see* paleomagnetism

magnetotelluric surveys *see under* geophysical surveys *under* Atlantic Ocean; Mauritania

Maine—geophysical surveys
seismic surveys: Avalon Terrane in eastern coastal Maine; seismic refraction–wide-angle reflection data
(Luetgert, James H., *et al.*) 9: 878

Maine—tectonophysics
crust: Avalon Terrane in eastern coastal Maine; seismic refraction–wide-angle reflection data
(Luetgert, James H., *et al.*) 9: 878

Malaysia—economic geology
gold ores: Sediment-hosted gold deposits; distal products of magmatic-hydrothermal systems
(Sillitoe, Richard H., *et al.*) 2: 157

mantle *see also under* geochemistry *under* Basin and Range Province; Colorado Plateau; Pacific Ocean; South America; *see also under* tectonophysics *under* Atlantic Ocean; North Sea

mantle—composition
mineral composition: Experimental study bearing on the absence of carbonate in mantle-derived xenoliths
(Canil, Dante) 10: 1011

mantle—properties
mechanical properties: Shear zones in the upper mantle; relationship between geochemical enrichment and deformation in mantle peridotites
(Downes, H.) 4: 374

marine geology *see also* oceanography

marine geology—experimental studies
sedimentation: Upslope flow of turbidity currents; a comparison among field observations, theory, and laboratory models
(Muck, Maureen T., *et al.*) 1: 54

marine sediments *see under* sediments

Mars—geomorphology
fluvial features: Magnitude of a catastrophic flood event at Kasei Valles, Mars
(Robinson, Mark S., *et al.*) 9: 902

Marshall Islands—stratigraphy
changes of level: Post-Miocene diagenetic and eustatic history of Enewetak Atoll; model and data comparison
(Quinn, Terrence M., *et al.*) 10: 942

Maryland—stratigraphy
Miocene: Late Tertiary floral assemblage from upland gravel deposits of the southern Maryland coastal plain
(McCartan, Lucy, *et al.*) 4: 311

Mauritania—geophysical surveys
magnetotelluric surveys: Structure of the Atlantic margin of Mauritania (western Africa) based on geoelectrical and drilling data
(Ritz, Michel, *et al.*) 6: 571

Mauritania—oceanography
continental margin: Structure of the Atlantic margin of Mauritania (western Africa) based on geoelectrical and drilling data
(Ritz, Michel, *et al.*) 6: 571

Mauritania—stratigraphy
Holocene: Across an early Holocene humid phase in western Sahara; pollen and isotope stratigraphy
(Lezine, Anne-Marie, *et al.*) 3: 264

Mediterranean region *see also* the individual countries; Corsica

Mediterranean region—structural geology
neotectonics: Neogene extensional collapse in the western Mediterranean (Betic-Rif Alpine orogenic belt); implications for the genesis of the Gibraltar Arc and magmatic activity; discussion
(Frizon de Lamotte, Dominique, *et al.*) 4: 381
— Neogene extensional collapse in the western Mediterranean (Betic-Rif Alpine orogenic belt); implications for the genesis of the Gibraltar Arc and magmatic activity; reply
(Doblas, Miguel, *et al.*) 4: 381

Mediterranean region—tectonophysics
plate tectonics: Ductile extension in Alpine Corsica
(Jolivet, Laurent, *et al.*) 10: 1007
— Mechanisms of blueschist creation and preservation in an A-type subduction zone, Mount Olympos region, Greece
(Schermer, Elizabeth R.) 11: 1130

Mediterranean Sea *see also* Corsica; Ionian Sea
Mediterranean Sea—stratigraphy
Cretaceous: Brief reversed polarity interval during the Cretaceous normal polarity superchron
(Tarduno, John A.) 8: 683
Melanesia *see also* Fiji; Solomon Islands
Mesozoic *see also* Cretaceous; *see also under* geochronology *under* Utah; *see also under* stratigraphy *under* Alps; Austria; Southwestern U.S.
Mesozoic—geochronology
time scales: Search for periodicity in global events in the geologic record; quo vadimus?
(Baksi, Ajoy K.) 10: 983
metal ores *see also* gold ores; platinum ores; tungsten ores; *see also under* economic geology *under* Appalachians
metal ores—genesis
controls: Integrated tectonic-genetic model for volcanic-hosted massive sulfide deposits
(Sawkins, Frederick J.) 11: 1061
metamorphic rocks *see also* igneous rocks; metamorphism; metasomatism
metamorphic rocks—facies
granulite facies: Archean protoliths within early Proterozoic granulitic crust of the West European Hercynian belt; possible relics of the West African Craton; discussion
(Kuijper, R. P.) 4: 382
— Archean protoliths within early Proterozoic granulitic crust of the West European Hercynian belt; possible relics of the West African craton; reply
(Guerrot, C., *et al.*) 4: 383
— Ion-microprobe dating of zircon from quartz-graphite veins at the Bristol, New Hampshire, metamorphic hot spot
(Zeitler, Peter K., *et al.*) 7: 626
metamorphic rocks—gneisses
orthogneiss: Kilbuck Terrane; oldest known rocks in Alaska
(Box, Stephen E., *et al.*) 12: 1219
metamorphic rocks—granulites
pelitic texture: Apparent isobaric cooling paths from granulites; two counterexamples from British Columbia and New Hampshire
(Selverstone, Jane, *et al.*) 4: 307
metamorphic rocks—metaigneous rocks
metagranite: Geochronologic and isotopic evidence for involvement of pre-Pan-African crust in the Nubian Shield, Egypt
(Sultan, Mohamed, *et al.*) 8: 761
textures: Crystal size of epidotes; a potentially exploitable geothermometer in geothermal fields?
(Patrier, Patricia, *et al.*) 11: 1126
metamorphic rocks—metaplutonic rocks
composition: Geobarometry, differential block movements, and crustal structure of the southwestern Abitibi greenstone belt, Canada
(Feng, Rui, *et al.*) 9: 870
metamorphic rocks—metasedimentary rocks
distribution: Ancient continental margin assemblage in the northern Coast Mountains, Southeast Alaska and Northwest Canada
(Gehrels, George E., *et al.*) 3: 208
— Proterozoic subduction and terrane amalgamation in the southwestern Grenville Province, Canada; evidence from ultrapotassic to shoshonitic plutonism
(Corriveau, Louise) 7: 614
fabric: Seismic anisotropy due to preferred mineral orientation observed in shallow crustal rocks in southern Alaska
(Brocher, Thomas M., *et al.*) 8: 737
metaconglomerate: Sulfidization of Witwatersrand black sands; from enigma to myth
(Reimer, Thomas O., *et al.*) 5: 426
metapelite: Growth and retrograde zoning in garnets from high-grade metapelites; implications for pressure-temperature paths
(Tuccillo, M. E., *et al.*) 9: 839
— Pressure-temperature-time path related to the thermotectonic evolution of an early Proterozoic metamorphic terrane, Black Hills, South Dakota
(Terry, Michael P., *et al.*) 8: 786
metamorphic rocks—mineral assemblages
facies: Role of extensional tectonics in exhumation of eclogites and blueschists in an oblique subduction setting; northeastern Venezuela
(Ave Lallemant, Hans G., *et al.*) 10: 950
zoning: High-pressure metamorphism and uplift of the Olympic subduction complex
(Brandon, Mark T., *et al.*) 12: 1252
metamorphic rocks—mylonites
geochemistry: Mass-transport mechanisms in deforming rocks; recognition using microstructural and microchemical criteria
(McCaig, Andrew M., *et al.*) 9: 824
metamorphic rocks—schists
blueschist: Mechanisms of blueschist creation and preservation in an A-type subduction zone, Mount Olympos region, Greece
(Schermer, Elizabeth R.) 11: 1130
— Post-Taconic blueschist suture in the Northern Appalachians of northern New Brunswick, Canada
(van Staal, Cees R., *et al.*) 11: 1073
textures: Metamorphosed weathering horizon from the Oetztal-Stubai crystalline complex (Eastern Alps, Austria)
(Krois, Peter, *et al.*) 11: 1095
metamorphism *see also* metamorphic rocks; metasomatism
metamorphism—contact metamorphism
aureoles: Bleaching of limestones in the Notch Peak contact-metamorphic aureole, Utah
(Todd, Clifford S.) 1: 83
temperature: Crystal size of epidotes; a potentially exploitable geothermometer in geothermal fields?
(Patrier, Patricia, *et al.*) 11: 1126
metamorphism—evolution
facies: Archean protoliths within early Proterozoic granulitic crust of the West European Hercynian belt; possible relics of the West African Craton; discussion
(Kuijper, R. P.) 4: 382
— Archean protoliths within early Proterozoic granulitic crust of the West European Hercynian belt; possible relics of the West African craton; reply
(Guerrot, C., *et al.*) 4: 383
orogenic belts: Cretaceous crustal structure and metamorphism in the hinterland of the Sevier thrust belt, western U.S. Cordillera; discussion
(Nelson, Robert B.) 6: 576
— Cretaceous crustal structure and metamorphism in the hinterland of the Sevier thrust belt, western U.S. Cordillera; reply
(Miller, Elizabeth L., *et al.*) 6: 577
metamorphism—grade
high-grade metamorphism: Ion-microprobe dating of zircon from quartz-graphite veins at the Bristol, New Hampshire, metamorphic hot spot
(Zeitler, Peter K., *et al.*) 7: 626
— Proterozoic collisional tectonism in the Trans-Hudson Orogen, Saskatchewan
(Bickford, M. E., *et al.*) 1: 14
indicators: Precollision and postcollision thermal events in the Himalaya
(Johnson, M. R. W., *et al.*) 8: 753
metamorphism—P-T conditions
geologic barometry: Constraints on Alleghanian vertical displacements in the southern Appalachian Piedmont, based on aluminum-in-hornblende barometry
(Vyhnal, Christopher R., *et al.*) 10: 938
— Geobarometry, differential block movements, and crustal structure of the southwestern Abitibi greenstone belt, Canada
(Feng, Rui, *et al.*) 9: 870
granulite facies: Apparent isobaric cooling paths from granulites; two counterexamples from British Columbia and New Hampshire
(Selverstone, Jane, *et al.*) 4: 307
high pressure: High-pressure metamorphism and uplift of the Olympic subduction complex
(Brandon, Mark T., *et al.*) 12: 1252
subduction zones: Ductile extension in Alpine Corsica
(Jolivet, Laurent, *et al.*) 10: 1007

zoning: Pressure-temperature-time path related to the thermotectonic evolution of an early Proterozoic metamorphic terrane, Black Hills, South Dakota
(Terry, Michael P., *et al.*) 8: 786

metamorphism—polymetamorphism
indicators: Use of reaction space in depicting polymetamorphic histories
(Schneiderman, Jill S.) 4: 350
plate collision: Mechanisms of blueschist creation and preservation in an A-type subduction zone, Mount Olympos region, Greece
(Schermer, Elizabeth R.) 11: 1130

metamorphism—prograde metamorphism
P-T conditions: Rapid growth and strain rates inferred from synkinematic garnets, Penokean Orogeny, Minnesota
(Holm, Daniel K., *et al.*) 2: 166

metamorphism—regional metamorphism
absolute age: Timing of middle Paleozoic (Acadian) metamorphism in the Southern Appalachians; K-Ar studies in the Talladega Belt, Alabama
(Kish, Stephen A.) 7: 650
evolution: Implications of shear-sense criteria for the tectonic evolution of the central Rhodope Massif, southern Bulgaria
(Burg, Jean-Pierre, *et al.*) 5: 451
— Northern Monashee Mountains, Omineca crystalline belt, British Columbia; timing of metamorphism, anatexis, and tectonic denudation; with Suppl. Data 90-06
(Sevigny, J. H., *et al.*) 2: 103

metamorphism—retrograde metamorphism
absolute age: $^{40}Ar/^{39}Ar$ laser-probe dating by step heating and spot fusion of phengites from the Dora Maira nappe of the Western Alps, Italy
(Scaillet, S., *et al.*) 8: 741
P-T conditions: Implications of post-thrusting extension and underplating for P-T-t paths in granulite terranes; a Grenville example
(Anovitz, L. M., *et al.*) 5: 466
— Role of extensional tectonics in exhumation of eclogites and blueschists in an oblique subduction setting; northeastern Venezuela
(Ave Lallemant, Hans G., *et al.*) 10: 950
zoning: Growth and retrograde zoning in garnets from high-grade metapelites; implications for pressure-temperature paths
(Tuccillo, M. E., *et al.*) 9: 839

metamorphism—shock metamorphism
shatter cones: Shatter cones and shocked rocks in southwestern Montana; the Beaverhead impact structure
(Hargraves, R. B., *et al.*) 9: 832

metasomatic rocks *see also* igneous rocks; metamorphic rocks; metamorphism; metasomatism

metasomatism *see also* metamorphism

metasomatism—geochemistry
mass transfer: Mass-transport mechanisms in deforming rocks; recognition using microstructural and microchemical criteria
(McCaig, Andrew M., *et al.*) 9: 824

metasomatism—processes
hydrothermal alteration: Hydrothermal alteration in anthracite from eastern Pennsylvania; implications for mechanisms of anthracite formation
(Daniels, Eric J., *et al.*) 3: 247
wallrock alteration: Bleaching of limestones in the Notch Peak contact-metamorphic aureole, Utah
(Todd, Clifford S.) 1: 83

meteor craters *see also under* geomorphology *under* USSR

methods *see under* chemical analysis; *see under* practice *under* geology

Mexico *see also* Gulf Coastal Plain

Mexico—geomorphology
eolian features: Development of the Gran Desierto sand sea, northwestern Mexico
(Blount, Grady, *et al.*) 8: 724

Mexico—hydrogeology
ground water: Geologic and environmental aspects of surface cementation, north coast, Yucatan, Mexico; discussion
(Smart, P. L., *et al.*) 8: 802
— Geologic and environmental aspects of surface cementation, north coast, Yucatan, Mexico; reply
(Perry, Eugene, *et al.*) 8: 803

Mexico—stratigraphy
Holocene: Sampling, species abundance, and the stratigraphic signature of mass extinction; a test using Holocene tidal flat molluscs
(Meldahl, Keith H.) 9: 890
Tertiary: Doomed pioneers; gravity-flow deposition and bioturbation in marine oxygen-deficient environments
(Follmi, Karl B., *et al.*) 11: 1069

Michigan—geomorphology
solution features: Glaciation and saline-freshwater mixing as a possible cause of cave formation in the eastern Midcontinent region of the United States; a conceptual model
(Panno, Samuel V., *et al.*) 8: 769

Michigan—structural geology
tectonics: Early history of the Michigan Basin; subsidence and Appalachian tectonics
(Howell, Paul D., *et al.*) 12: 1195

Micronesia *see also* Marshall Islands

micropaleontology—experimental studies
taphonomy: Gravitational settling of conodont elements; implications for paleoecologic interpretations of conodont assemblages
(Broadhead, Thomas W., *et al.*) 9: 850

Middle East *see also* Cyprus; Israel; Syria; Turkey

Middle East—tectonophysics
crust: Early Pan-African evolution of the basement around Elat, Israel, and the Sinai Peninsula revealed by single-zircon evaporation dating, and implications for crustal accretion rates
(Kroner, A., *et al.*) 6: 545

Midwest *see also* Illinois; Kansas; Michigan; Minnesota; Missouri; Ohio; South Dakota; Wisconsin

Midwest—hydrogeology
ground water: Sulfur isotope evidence for regional recharge of saline water during continental glaciation, north-central United States
(Siegel, D. I.) 11: 1054

mineral deposits, genesis—base metals
absolute age: Are the alteration halos of massive sulfide deposits syngenetic? Evidence from U-Pb dating of hydrothermal rutile at the Kidd volcanic center, Abitibi Subprovince, Canada
(Schandl, Eva Susan, *et al.*) 6: 505

mineral deposits, genesis—controls
structural controls: Evidence for episodic basin dewatering in salt-dome cap rocks
(Hallager, W. S., *et al.*) 8: 716

mineral deposits, genesis—gold ores
hydrothermal processes: Mesozoic hydrothermal alteration associated with gold mineralization in the Mercur District, Utah
(Wilson, Paula N., *et al.*) 9: 866
ore-forming fluids: Integrated model for Meguma Group lode gold deposits, Nova Scotia, Canada
(Kontak, Daniel J., *et al.*) 3: 238
ore transport: Colloidal transport of gold and silica in epithermal precious-metal systems; evidence from the Sleeper Deposit, Nevada
(Saunders, James A.) 8: 757
— Epithermal gold deposits remobilized from Precambrian volcanogenic sulfide source during late Cenozoic continental rifting
(Fulp, Michael S., *et al.*) 2: 179
— Sediment-hosted gold deposits; distal products of magmatic-hydrothermal systems
(Sillitoe, Richard H., *et al.*) 2: 157
structural controls: Geodynamic setting of mesothermal gold deposits; an association with accretionary tectonic regimes
(Kerrich, Robert, *et al.*) 9: 882
— Water-sill hypothesis for the origin of certain veins in the Meguma Group, Nova Scotia, Canada
(Henderson, J. R., *et al.*) 7: 654

mineral deposits, genesis—lead-zinc deposits
structural controls: Focused fluid flow and Ozark mississippi valley-type deposits
(Clendenin, C. W., *et al.*) 2: 116

mineral deposits, genesis—metal ores
controls: Integrated tectonic-genetic model for volcanic-hosted massive sulfide deposits
(Sawkins, Frederick J.) 11: 1061
sedimentary processes: Sulfidization of Witwatersrand black sands; from enigma to myth
(Reimer, Thomas O., *et al.*) 5: 426
structural controls: Timing of mississippi valley-type mineralization; relation to Appalachian orogenic events
(Kesler, Stephen E., *et al.*) 11: 1115

mineral deposits, genesis—phosphate deposits
environment: Phosphogenesis and weathering of shelf sediments from the Southeastern United States; implications for Miocene $\delta^{13}C$ excursions and global cooling
(Compton, John S., *et al.*) 12: 1227

mineral deposits, genesis—platinum ores
interpretation: Acraman impact ejecta and host shales; evidence for low-temperature mobilization of iridium and other platinoids
(Wallace, Malcolm W., *et al.*) 2: 132
ore transport: Speciation and solubility of palladium in aqueous magmatic-hydrothermal solutions
(Sassani, David C., *et al.*) 10: 925

mineral deposits, genesis—processes
plate tectonics: Subduction, arc reversal, and the origin of porphyry copper-gold deposits in island arcs
(Solomon, M.) 7: 630

mineral deposits, genesis—tungsten ores
ore-forming fluids: Evaporites and strata-bound tungsten mineralization; discussion
(Trudu, Alfonso G.) 2: 188
— Evaporites and strata-bound tungsten mineralization; reply
(Ririe, G. Todd) 2: 189

mineral deposits, genesis—uranium ores
hydrogeological controls: Hydrogeology of an ancient arid closed basin; implications for tabular sandstone-hosted uranium deposits
(Sanford, Richard F.) 11: 1099

mineral exploration—ore guides
gold ores: Epithermal gold deposits remobilized from Precambrian volcanogenic sulfide source during late Cenozoic continental rifting
(Fulp, Michael S., *et al.*) 2: 179

mineral prospecting *see* mineral exploration

mineral resources *see also* the individual deposits

minerals *see also* crystal chemistry; crystal growth

minerals—carbonates
calcite: Intracrystalline carbon and oxygen isotope variations in calcite revealed by laser microsampling
(Dickson, J. A. D., *et al.*) 9: 809
— New type of compositional zoning in calcite; insights into crystal-growth mechanisms
(Paquette, Jeanne, *et al.*) 12: 1244

minerals—chain silicates, clinopyroxene
crystal chemistry: Discrimination of ophiolitic from nonophiolitic ultramafic-mafic allochthons in orogenic belts by the Al/Ti ratio in clinopyroxene
(Loucks, Robert R.) 4: 346

minerals—framework silicates, plagioclase
myrmekite: Cathodoluminescence microscopy of myrmekite
(Hopson, R. Forrest, *et al.*) 4: 336
— Cathodoluminescence microscopy of myrmekite; discussion
(Collins, Lorence G.) 11: 1163
— Cathodoluminescence microscopy of myrmekite; reply
(Hopson, R. Forrest, *et al.*) 11: 1163

minerals—orthosilicates, epidote group
crystal growth: Crystal size of epidotes; a potentially exploitable geothermometer in geothermal fields?
(Patrier, Patricia, *et al.*) 11: 1126

Minnesota—petrology
metamorphism: Rapid growth and strain rates inferred from synkinematic garnets, Penokean Orogeny, Minnesota
(Holm, Daniel K., *et al.*) 2: 166

Miocene *see also under* stratigraphy *under* California; Maryland; Southeastern U.S.

miospores *see under* palynomorphs

Mississippi Valley—seismology
earthquakes: Diapiric origin of the Blytheville and Pascola arches in the Reelfoot Rift, east-central United States; relation to New Madrid seismicity
(McKeown, F. A., *et al.*) 11: 1158

Mississippi Valley—structural geology
faults: Major Proterozoic basement features of the eastern Midcontinent of North America revealed by recent COCORP profiling; discussion
(Nelson, W. John) 4: 378
— Major Proterozoic basement features of the eastern Midcontinent of North America revealed by recent COCORP profiling; reply
(Pratt, Thomas, *et al.*) 4: 378

Mississippian *see also* Carboniferous; *see also under* stratigraphy *under* Nevada; Utah

Missouri—economic geology
lead-zinc deposits: Focused fluid flow and Ozark mississippi valley-type deposits
(Clendenin, C. W., *et al.*) 2: 116

Mohorovicic discontinuity *see also* crust; mantle

mollusks—biochemistry
isotopes: High-paleolatitude Late Cretaceous paleotemperatures; new data from James Ross Island, Antarctica
(Pirrie, D., *et al.*) 1: 31

mollusks—ecology
intertidal environment: Sampling, species abundance, and the stratigraphic signature of mass extinction; a test using Holocene tidal flat molluscs
(Meldahl, Keith H.) 9: 890

mollusks—gastropods
Holocene: Stable-isotope record of organic carbon from an evolving carbonate banktop, Bight of Abaco, Bahamas
(Rasmussen, Kenneth A., *et al.*) 8: 790

mollusks—paleoecology
Eocene: Eocene deep-sea communities in localized limestones formed by subduction-related methane seeps, southwestern Washington
(Goedert, James L., *et al.*) 12: 1182

Montana—geochronology
Archean: U-Pb and Sm-Nd ages for the Stillwater Complex and its associated sills and dikes, Beartooth Mountains, Montana; identification of a parent magma?; with Suppl. Data 90-26
(Premo, W. R., *et al.*) 11: 1065

Montana—petrology
metamorphism: Shatter cones and shocked rocks in southwestern Montana; the Beaverhead impact structure
(Hargraves, R. B., *et al.*) 9: 832

Montana—stratigraphy
Cretaceous: Reworking of Cretaceous dinosaurs into Paleocene channel deposits, upper Hell Creek Formation, Montana
(Lofgren, Donald L., *et al.*) 9: 874
Paleocene: Reworking of Cretaceous dinosaurs into Paleocene channel deposits, upper Hell Creek Formation, Montana
(Lofgren, Donald L., *et al.*) 9: 874

Montana—structural geology
tectonics: Dillon Cutoff; basement involved tectonic link between the Disturbed Belt of west-central Montana and overthrust belt of extreme southwestern Montana
(O'Neill, J. Michael, *et al.*) 11: 1107

Moon—geochemistry
trace elements: Reading the Moon's volcanic record by ion microprobe analysis of Apollo 14 glass beads
(Papike, J. J., *et al.*) 4: 295

Morocco—petrology
magmas: Nested granites in question; contrasted emplacement kinematics of independent magmas in the Zaer Pluton, Morocco
(Bouchez, Jean Luc, *et al.*) 10: 966

mud volcanoes *see also* volcanology

Namibia—geochemistry
isotopes: Oxygen isotope geochemistry of the silicic volcanic rocks of the Etendeka-Parana Province; source constraints
(Harris, Chris, *et al.*) 11: 1119

Namibia—structural geology
tectonics: Multiple detachment model for the early rifting stage of the late Proterozoic Damara Orogen in Namibia
(Henry, G., *et al.*) 1: 67

nannofossils *see under* algal flora

natural gas—exploration
geochemical indicators: Noble gas and methane partitioning from ground water; an aid to natural gas exploration and reservoir evaluation
(Zaikowski, Anthony, *et al.*) 1: 72

neodymium—isotopes
Nd-144/Nd-143: Geochronologic and isotopic evidence for involvement of pre-Pan-African crust in the Nubian Shield, Egypt
(Sultan, Mohamed, *et al.*) 8: 761
— Intraplate-type magmatism in a continent–island-arc collision zone; Porgera intrusive complex, Papua New Guinea
(Richards, Jeremy P., *et al.*) 10: 958
— Mantle sources in the Arizona transition zone and global mantle heterogeneity
(Cooper, Jeanne L., *et al.*) 11: 1146
— Modified Gulf of California model for South Georgia, North Scotia Ridge, and implications for the Rocas Verdes back-arc basin, Southern Andes
(Alabaster, T., *et al.*) 6: 497
— Nd- and Pb-isotope variations in the multicyclic central caldera cluster of the San Juan volcanic field, Colorado, and implications for crustal hybridization
(Riciputi, Lee R., *et al.*) 10: 975
— Nd isotopic gradients in upper crustal magma chambers; evidence for in situ magma–wall-rock interaction
(Tegtmeyer, K. J., *et al.*) 1: 5
— Rapid uplift and crustal growth in extensional environments; an isotopic study from the Death Valley region, California
(Asmerom, Yemane, *et al.*) 3: 223
— Shear zones in the upper mantle; relationship between geochemical enrichment and deformation in mantle peridotites
(Downes, H.) 4: 374

neon—geochemistry
ground water: Noble gas and methane partitioning from ground water; an aid to natural gas exploration and reservoir evaluation
(Zaikowski, Anthony, *et al.*) 1: 72

neotectonics *see also* changes of level; tectonics; *see also under* structural geology *under* Alps; Basin and Range Province; California; Cyprus; Greece; Himalayas; Idaho; Kenya; Mediterranean region; Nevada; Panama; Taiwan; Washington

neotectonics—measurement
field studies: Visibility of fault strands in exploratory trenches and timing of rupture events
(Bonilla, Manuel G., *et al.*) 2: 153

neotectonics—uplifts
rates: Surface uplift, uplift of rocks, and exhumation of rocks
(England, Philip, *et al.*) 12: 1173

Netherlands Antilles—sedimentary petrology
sedimentation: Halite depositional facies in a solar salt pond; a key to interpreting physical energy and water depth in ancient deposits?
(Handford, C. Robertson) 8: 691

Nevada—economic geology
gold ores: Colloidal transport of gold and silica in epithermal precious-metal systems; evidence from the Sleeper Deposit, Nevada
(Saunders, James A.) 8: 757
— Sediment-hosted gold deposits; distal products of magmatic-hydrothermal systems
(Sillitoe, Richard H., *et al.*) 2: 157

Nevada—geochemistry
neodymium: Nd isotopic gradients in upper crustal magma chambers; evidence for in situ magma–wall-rock interaction
(Tegtmeyer, K. J., *et al.*) 1: 5

Nevada—geochronology
Cretaceous: Cretaceous crustal structure and metamorphism in the hinterland of the Sevier thrust belt, western U.S. Cordillera; discussion
(Nelson, Robert B.) 6: 576
— Cretaceous crustal structure and metamorphism in the hinterland of the Sevier thrust belt, western U.S. Cordillera; reply
(Miller, Elizabeth L., *et al.*) 6: 577

Nevada—geomorphology
volcanic features: Geomorphic assessment of late Quaternary volcanism in the Yucca Mountain area, southern Nevada; implications for the proposed high-level radioactive waste repository
(Wells, S. G., *et al.*) 6: 549

Nevada—soils
pedogenesis: Soil-forming intervals caused by eolian sediment pulses in the Lahontan Basin, northwestern Nevada
(Chadwick, Oliver A., *et al.*) 3: 243

Nevada—stratigraphy
Cretaceous: Cretaceous to early Tertiary paleogeography in the hinterland of the Sevier thrust belt, east-central Nevada
(Vandervoort, Dirk S., *et al.*) 6: 567
Mississippian: Sequence stratigraphy and evolution of the Antler foreland basin, east-central Nevada
(Trexler, James H., Jr., *et al.*) 5: 422
Paleogene: Cretaceous to early Tertiary paleogeography in the hinterland of the Sevier thrust belt, east-central Nevada
(Vandervoort, Dirk S., *et al.*) 6: 567
Quaternary: Timing of late Quaternary faulting in the 1954 Dixie Valley earthquake area, central Nevada
(Bell, John W., *et al.*) 7: 622

Nevada—structural geology
neotectonics: Paleomagnetic evidence for counterclockwise block rotation in the North Nevada rift region
(Li, Yianping, *et al.*) 1: 79
— Timing of late Quaternary faulting in the 1954 Dixie Valley earthquake area, central Nevada
(Bell, John W., *et al.*) 7: 622
tectonics: Late Paleozoic extension in the Great Basin, Western United States
(Smith, David Lee, *et al.*) 8: 712

Nevada—tectonophysics
crust: Extension of the Yellowstone Plateau, eastern Snake River plain, and Owyhee Plateau; with Suppl. Data 90-28
(Rodgers, David W., *et al.*) 11: 1138

New Brunswick—geochronology
Silurian: Tectonic significance of Silurian magmatism in the Canadian Appalachians
(Bevier, Mary Lou, *et al.*) 5: 411

New Brunswick—petrology
metamorphic rocks: Post-Taconic blueschist suture in the Northern Appalachians of northern New Brunswick, Canada
(van Staal, Cees R., *et al.*) 11: 1073

New Brunswick—structural geology
tectonics: Transtensional arm of the early Mesozoic Fundy rift basin; penecontemporaneous faulting and sedimentation
(Olsen, Paul E., *et al.*) 8: 695

New England—structural geology
isostasy: Geochronologic studies in central New England II; post-Acadian hinged and differential uplift; discussion
(Haugerud, Ralph A.) 2: 183
— Geochronologic studies in central New England II; post-Acadian hinged and differential uplift; reply
(Harrison, T. Mark, *et al.*) 2: 184

New Hampshire—geochronology
Devonian: Ion-microprobe dating of zircon from quartz-graphite veins at the Bristol, New Hampshire, metamorphic hot spot
(Zeitler, Peter K., *et al.*) 7: 626

New Hampshire—petrology
metamorphism: Apparent isobaric cooling paths from granulites; two counterexamples from British Columbia and New Hampshire
(Selverstone, Jane, *et al.*) 4: 307

New Jersey—geochronology
Jurassic: U/Pb zircon and baddeleyite ages for the Palisades and Gettysburg sills of the northeastern United States; implications for the age of the Triassic/Jurassic boundary
(Dunning, G. R., *et al.*) 8: 795
Triassic: U/Pb zircon and baddeleyite ages for the Palisades and Gettysburg sills of the northeastern United States; implications for the age of the Triassic/Jurassic boundary
(Dunning, G. R., *et al.*) 8: 795

New Jersey—petrology
intrusions: Palisades Sill; origin of the olivine zone by separate magmatic injection rather than gravity settling
(Husch, Jonathan M.) 8: 699

New Mexico—economic geology
gold ores: Epithermal gold deposits remobilized from Precambrian volcanogenic sulfide source during late Cenozoic continental rifting
(Fulp, Michael S., *et al.*) 2: 179
uranium ores: Hydrogeology of an ancient arid closed basin; implications for tabular sandstone-hosted uranium deposits
(Sanford, Richard F.) 11: 1099

New Mexico—sedimentary petrology
sedimentation: Actualistic sandstone petrofacies; discriminating modern and ancient source rocks
(Ingersoll, Raymond V.) 8: 733

New York—geomorphology
glacial geology: Evidence for large-scale subglacial meltwater flood events in southern Ontario and northern New York State
(Shaw, John, *et al.*) 12: 1169

New York—hydrogeology
hydrology: Cyanobacterial precipitation of gypsum, calcite, and magnesite from natural alkaline lake water
(Thompson, J. B., *et al.*) 10: 995

New York—petrology
intrusions: Palisades Sill; origin of the olivine zone by separate magmatic injection rather than gravity settling
(Husch, Jonathan M.) 8: 699

New Zealand—economic geology
petroleum: Deep seismic expression of a foreland basin; Taranaki Basin, New Zealand
(Stern, T. A., *et al.*) 10: 979

New Zealand—geophysical surveys
seismic surveys: Deep seismic expression of a foreland basin; Taranaki Basin, New Zealand
(Stern, T. A., *et al.*) 10: 979

New Zealand—tectonophysics
crust: Deep seismic expression of a foreland basin; Taranaki Basin, New Zealand
(Stern, T. A., *et al.*) 10: 979
plate tectonics: Two-sided orogen; collision and erosion from the sandbox to the Southern Alps, New Zealand
(Koons, P. O.) 8: 679

Newfoundland—stratigraphy
Paleozoic: Early Paleozoic paleogeography and accretionary history of the Newfoundland Appalachians
(van der Pluijm, Ben A., *et al.*) 9: 898

Newfoundland—structural geology
structural analysis: Structure of the Appalachian deformation front in western Newfoundland; implications of multichannel seismic reflection data
(Stockmal, Glen S., *et al.*) 8: 765
tectonics: Kinematic model for southwestern Newfoundland based upon Silurian sinistral shearing; discussion
(Blewett, R. S., *et al.*) 12: 1257
— Kinematic model for southwestern Newfoundland based upon Silurian sinistral shearing; reply
(Currie, K. L., *et al.*) 12: 1257

noble gases *see also* argon; helium; neon

noble gases—geochemistry
ground water: Noble gas and methane partitioning from ground water; an aid to natural gas exploration and reservoir evaluation
(Zaikowski, Anthony, *et al.*) 1: 72

nomenclature *see under* sedimentary structures; stratigraphy; structural geology

North America *see also* Appalachians; Atlantic Coastal Plain; Great Lakes; Great Lakes region; Great Plains; Gulf Coastal Plain; Mexico

North America—geochronology
Pennsylvanian: Pennsylvanian time scales and cycle periods
(Klein, George DeVries) 5: 455

North America—geomorphology
changes of level: Drumlins, subglacial meltwater floods, and ocean responses; discussion
(Kehew, Alan E., *et al.*) 5: 479
— Drumlins, subglacial meltwater floods, and ocean responses; reply
(Shaw, John) 5: 480

North America—structural geology
tectonics: Regionally extensive mid-Cretaceous west-vergent thrust system in the northwestern Cordillera; implications for continent-margin tectonism
(Rubin, Charles M., *et al.*) 3: 276

North America—tectonophysics
crust: Ancient continental margin assemblage in the northern Coast Mountains, Southeast Alaska and Northwest Canada
(Gehrels, George E., *et al.*) 3: 208
— Major Proterozoic basement features of the eastern Midcontinent of North America revealed by recent COCORP profiling; discussion
(Nelson, W. John) 4: 378
— Major Proterozoic basement features of the eastern Midcontinent of North America revealed by recent COCORP profiling; reply
(Pratt, Thomas, *et al.*) 4: 378
plate tectonics: Direction and shear sense during suturing of the Seven Devils-Wallowa Terrane against North America in western Idaho; discussion
(Lund, Karen, *et al.*) 10: 1031
— Direction and shear sense during suturing of the Seven Devils-Wallowa Terrane against North America in western Idaho; reply
(Strayer, Luther M., IV, *et al.*) 10: 1031

North Carolina—stratigraphy
Pliocene: High eustatic sea level during the middle Pliocene; evidence from the Southeastern U.S. Atlantic Coastal Plain; with Suppl. Data 90-13
(Dowsett, Harry J., *et al.*) 5: 435

North Sea—economic geology
petroleum: Diagenetic quartzarenite and destruction of secondary porosity; an example from the Middle Jurassic Brent Sandstone of Northwest Europe; discussion
(Scotchman, I. C.) 8: 799
— Diagenetic quartzarenite and destruction of secondary porosity; an example from the Middle Jurassic Brent Sandstone of Northwest Europe; reply
(Harris, Nicholas B.) 8: 799

North Sea—sedimentary petrology
diagenesis: Ancient subaerial exposure and freshwater leaching in sandstones
(Emery, D., *et al.*) 12: 1178
— Diagenetic quartzarenite and destruction of secondary porosity; an example from the Middle Jurassic Brent Sandstone of Northwest Europe; discussion
(Shanmugam, G.) 3: 287
— Diagenetic quartzarenite and destruction of secondary porosity; an example from the Middle Jurassic Brent Sandstone of Northwest Europe; reply
(Harris, Nicholas B.) 3: 288
— Linear coupling of carbon and strontium isotopes in Rotliegend Sandstone, North Sea; evidence for cross-formational fluid flow
(Sullivan, Morgan D., *et al.*) 12: 1215

North Sea—tectonophysics
mantle: Mantle shear zones and the evolution of the northern North Sea basin
(Reston, T. J.) 3: 272

Northern Hemisphere *see also* Africa; Asia; Atlantic Ocean; Eurasia; Europe; North America; Pacific Ocean; USSR

Northwest Territories—geochemistry
isotopes: Did major changes in the stable-isotope composition of Proterozoic seawater occur?
(Burdett, J. W., *et al.*) 3: 227

Northwest Territories—geophysical surveys
seismic surveys: Middle Proterozoic piggyback basin in the subsurface of northwestern Canada
(Cook, Frederick A., *et al.*) 7: 662
surveys: Lithosphere folds in the Eurekan Orogen, Arctic Canada?
(Stephenson, R. A., *et al.*) 7: 603

Northwest Territories—stratigraphy
Proterozoic: Ediacaran remains from intertillite beds in northwestern Canada
(Hofmann, H. J., *et al.*) 12: 1199

Northwest Territories—structural geology
tectonics: Lithosphere folds in the Eurekan Orogen, Arctic Canada?
(Stephenson, R. A., *et al.*) 7: 603

Northwest Territories—tectonophysics
crust: Lithosphere folds in the Eurekan Orogen, Arctic Canada?
(Stephenson, R. A., *et al.*) 7: 603

Norway—geophysical surveys
seismic surveys: Deformation of the Baltic continental crust during Caledonide intracontinental subduction; views from seismic reflection data; discussion
(Hauser, Ernest C.) 6: 578
— Deformation of the Baltic continental crust during Caledonide intracontinental subduction; views from seismic reflection data; reply
(Hurich, C. A., *et al.*) 6: 579

Nova Scotia—economic geology
gold ores: Integrated model for Meguma Group lode gold deposits, Nova Scotia, Canada
(Kontak, Daniel J., *et al.*) 3: 238
— Water-sill hypothesis for the origin of certain veins in the Meguma Group, Nova Scotia, Canada
(Henderson, J. R., *et al.*) 7: 654

Nova Scotia—stratigraphy
Paleozoic: Tectono-stratigraphic terranes in Cape Breton Island, Nova Scotia; implications for the configuration of the northern Appalachian Orogen; discussion
(Keppie, J. D.) 7: 669
— Tectono-stratigraphic terranes in Cape Breton Island, Nova Scotia; implications for the configuration of the northern Appalachian Orogen; reply
(Barr, Sandra M., *et al.*) 7: 670
Proterozoic: Tectono-stratigraphic terranes in Cape Breton Island, Nova Scotia; implications for the configuration of the northern Appalachian Orogen; discussion
(Keppie, J. D.) 7: 669
— Tectono-stratigraphic terranes in Cape Breton Island, Nova Scotia; implications for the configuration of the northern Appalachian Orogen; reply
(Barr, Sandra M., *et al.*) 7: 670

Nova Scotia—structural geology
deformation: Tectonic control on the origin and orientation of igneous layering; an example from the Greendale Complex, Antigonish Highlands, Nova Scotia, Canada
(Murphy, J. Brendan, *et al.*) 5: 403
tectonics: Transtensional arm of the early Mesozoic Fundy rift basin; penecontemporaneous faulting and sedimentation
(Olsen, Paul E., *et al.*) 8: 695

ocean circulation *see also under* oceanography *under* Atlantic Ocean; Pacific Ocean

ocean floors *see also under* oceanography *under* Atlantic Ocean; Bahamas; Pacific Ocean

oceanography—theoretical studies
sedimentation: Upslope flow of turbidity currents; a comparison among field observations, theory, and laboratory models
(Muck, Maureen T., *et al.*) 1: 54

Ohio—geophysical surveys
seismic surveys: A tale of two sutures; COCORP's deep seismic surveys of the Grenville Province in the Eastern U.S. Midcontinent
(Culotta, Raymond C., *et al.*) 7: 646

Ohio—stratigraphy
Pleistocene: Diagenetic, nonevaporative origin for gypsum
(Bain, Roger J.) 5: 447

oil *see* petroleum

oil and gas fields *see also* natural gas; petroleum

Oklahoma—economic geology
petroleum: Remagnetization of the Rush Springs Formation, Cement, Oklahoma; implications for dating hydrocarbon migration and aeromagnetic exploration
(Elmore, R. Douglas, *et al.*) 2: 124

Oklahoma—geochronology
Holocene: Channel trenching and climatic change in the Southern U.S. Great Plains; with Suppl. Data 90-09
(Hall, Stephen A.) 4: 342

Oklahoma—stratigraphy
Pennsylvanian: Middle Pennsylvanian recurrent uplift of the Ouachita fold belt and basin subsidence in the Arkoma Basin, Oklahoma
(Elmore, R. Douglas, *et al.*) 9: 906
Permian: Remagnetization of the Rush Springs Formation, Cement, Oklahoma; implications for dating hydrocarbon migration and aeromagnetic exploration
(Elmore, R. Douglas, *et al.*) 2: 124

Oklahoma—structural geology
tectonics: Middle Pennsylvanian recurrent uplift of the Ouachita fold belt and basin subsidence in the Arkoma Basin, Oklahoma
(Elmore, R. Douglas, *et al.*) 9: 906
— Morphology of the Frontal fault zone, Southwest Oklahoma; implications for deformation and deposition in the Wichita Uplift and Anadarko Basin; with Suppl. Data 90-16
(McConnell, David A., *et al.*) 7: 634

Oligocene *see also under* geochronology *under* Alaska

Ontario—economic geology
base metals: Are the alteration halos of massive sulfide deposits syngenetic? Evidence from U-Pb dating of hydrothermal rutile at the Kidd volcanic center, Abitibi Subprovince, Canada
(Schandl, Eva Susan, *et al.*) 6: 505

Ontario—geomorphology
glacial geology: Evidence for large-scale subglacial meltwater flood events in southern Ontario and northern New York State
(Shaw, John, *et al.*) 12: 1169

Ontario—geophysical surveys
seismic surveys: Southern Abitibi greenstone belt; Archean crustal structure from seismic-reflection profiles
(Jackson, S. L., *et al.*) 11: 1086
— Thin thrust sheet formation of the Kapuskasing structural zone revealed by Lithoprobe seismic reflection data
(Geis, Wayne T., *et al.*) 6: 513

Ontario—petrology
metamorphism: Growth and retrograde zoning in garnets from high-grade metapelites; implications for pressure-temperature paths
(Tuccillo, M. E., *et al.*) 9: 839
— Implications of post-thrusting extension and underplating for P-T-t paths in granulite terranes; a Grenville example
(Anovitz, L. M., *et al.*) 5: 466
Ontario—sedimentary petrology
sedimentation: Macrofabrics and quartz microstructures confirm glacial origin of Sunnybrook Drift in the Lake Ontario Basin
(Mahaney, William C.) 2: 145
— Macrofabrics and quartz microstructures confirm glacial origin of the Sunnybrook Drift in the Lake Ontario Basin; discussion
(Gomez, Basil) 10: 1032
— Macrofabrics and quartz microstructures confirm glacial origin of the Sunnybrook Drift in the Lake Ontario Basin; reply
(Mahaney, William C.) 10: 1033
Ontario—structural geology
tectonics: Geobarometry, differential block movements, and crustal structure of the southwestern Abitibi greenstone belt, Canada
(Feng, Rui, *et al.*) 9: 870
ophiolite *see under* ultramafics *under* igneous rocks
Ordovician—stratigraphy
biostratigraphy: Stratigraphic significance of Cruziana; new data concerning the Cambrian-Ordovician ichnostratigraphic paradigm
(Magwood, James P. A., *et al.*) 8: 729
paleogeography: Sedimentological evidence for a limited separation between Armorica and Gondwana during the Early Ordovician
(Noblet, C., *et al.*) 4: 303
ore guides *see under* mineral exploration
Oregon—geochemistry
neodymium: Nd isotopic gradients in upper crustal magma chambers; evidence for in situ magma–wall-rock interaction
(Tegtmeyer, K. J., *et al.*) 1: 5
Oregon—stratigraphy
Jurassic: Implications of new Jurassic stratigraphic, geochronometric, and paleolatitudinal data from the western Klamath Terrane (Smith River and Rogue Valley subterranes)
(Pessagno, Emile A., Jr., *et al.*) 7: 665
organic materials *see also* natural gas; petroleum
organic materials—alteration
diagenesis: Dolomite formation in anoxic sediments of Kau Bay, Indonesia
(Middelburg, Jack J., *et al.*) 5: 399
organic materials—bitumens
geochemistry: Pb-Pb dating of hydrocarbon migration into a bitumen-bearing ore deposit, North Wales
(Parnell, John, *et al.*) 10: 1028
organic materials—carbohydrates
lignin: Lignin, land plants, and fungi; biological evolution affecting Phanerozoic oxygen balance
(Robinson, Jennifer M.) 7: 607
organic materials—geochemistry
marine sediments: Stable-isotope record of organic carbon from an evolving carbonate banktop, Bight of Abaco, Bahamas
(Rasmussen, Kenneth A., *et al.*) 8: 790
organic materials—hydrocarbons
methane: Noble gas and methane partitioning from ground water; an aid to natural gas exploration and reservoir evaluation
(Zaikowski, Anthony, *et al.*) 1: 72
orogeny *see also* tectonics
orogeny—absolute age
Acadian Phase: Geochronologic studies in central New England II; post-Acadian hinged and differential uplift; discussion
(Haugerud, Ralph A.) 2: 183
— Geochronologic studies in central New England II; post-Acadian hinged and differential uplift; reply
(Harrison, T. Mark, *et al.*) 2: 184
— Ion-microprobe dating of zircon from quartz-graphite veins at the Bristol, New Hampshire, metamorphic hot spot
(Zeitler, Peter K., *et al.*) 7: 626
— Timing of middle Paleozoic (Acadian) metamorphism in the Southern Appalachians; K-Ar studies in the Talladega Belt, Alabama
(Kish, Stephen A.) 7: 650
Andean Orogeny: Evolution of continental crust in the Central Andes; constraints from Nd isotope systematics; discussion
(Hsu, Kenneth J.) 5: 478
— Evolution of continental crust in the Central Andes; constraints from Nd isotope systematics; reply
(Harris, N. B. W.) 5: 478
Pan-African Orogeny: Early Pan-African evolution of the basement around Elat, Israel, and the Sinai Peninsula revealed by single-zircon evaporation dating, and implications for crustal accretion rates
(Kroner, A., *et al.*) 6: 545
Taconic Orogeny: Tectonic significance of Silurian magmatism in the Canadian Appalachians
(Bevier, Mary Lou, *et al.*) 5: 411
orogeny—concepts
decollement: Transpression, orogenic float, and lithospheric balance
(Oldow, John S., *et al.*) 10: 991
orogeny—evolution
Acadian Phase: Structure of the Appalachian deformation front in western Newfoundland; implications of multichannel seismic reflection data
(Stockmal, Glen S., *et al.*) 8: 765
Appalachian Phase: Early Paleozoic paleogeography and accretionary history of the Newfoundland Appalachians
(van der Pluijm, Ben A., *et al.*) 9: 898
— Tectono-stratigraphic terranes in Cape Breton Island, Nova Scotia; implications for the configuration of the northern Appalachian Orogen; discussion
(Keppie, J. D.) 7: 669
— Tectono-stratigraphic terranes in Cape Breton Island, Nova Scotia; implications for the configuration of the northern Appalachian Orogen; reply
(Barr, Sandra M., *et al.*) 7: 670
— Timing of mississippi valley-type mineralization; relation to Appalachian orogenic events
(Kesler, Stephen E., *et al.*) 11: 1115
Hercynian Orogeny: I-type granitoids as indicators of a late Paleozoic convergent ocean-continent margin along the southern flank of the central European Variscan Orogen
(Finger, F., *et al.*) 12: 1207
orogenic belts: Paleozoic accretion and Cenozoic redeformation of the Chinese Tien Shan Range, Central Asia
(Windley, B. F., *et al.*) 2: 128
— Precambrian tectonic evolution of part of Gondwana, southwestern Australia
(Myers, John S.) 6: 537
orogeny—mechanism
Allegheny Orogeny: Constraints on Alleghanian vertical displacements in the southern Appalachian Piedmont, based on aluminum-in-hornblende barometry
(Vyhnal, Christopher R., *et al.*) 10: 938
Alpine Orogeny: Ductile extension in Alpine Corsica
(Jolivet, Laurent, *et al.*) 10: 1007
— Extension in compressional orogenic belts; the Eastern Alps; discussion
(Behrmann, J. H.) 7: 673
— Extension in compressional orogenic belts; the Eastern Alps; discussion
(Wallis, S. R.) 7: 675
— Extension in compressional orogenic belts; the Eastern Alps; reply
(Ratschbacher, L., *et al.*) 7: 673
— Extension in compressional orogenic belts; the Eastern Alps; reply
(Ratschbacher, L., *et al.*) 7: 675
— Mechanisms of blueschist creation and preservation in an A-type subduction zone, Mount Olympos region, Greece
(Schermer, Elizabeth R.) 11: 1130
Andean Orogeny: Lower bound on the amount of crustal shortening in the central Bolivian Andes
(Sheffels, Barbara Moths) 9: 812

Appalachian Phase: Gulf Coast-East Coast magnetic anomaly; I, Root of the main crustal decollement for the Appalachian-Ouachita Orogen
(Hall, David J.) 9: 862
Caledonian Orogeny: Deformation of the Baltic continental crust during Caledonide intracontinental subduction; views from seismic reflection data; discussion
(Hauser, Ernest C.) 6: 578
— Deformation of the Baltic continental crust during Caledonide intracontinental subduction; views from seismic reflection data; reply
(Hurich, C. A., *et al.*) 6: 579
Damara Orogeny: Multiple detachment model for the early rifting stage of the late Proterozoic Damara Orogen in Namibia
(Henry, G., *et al.*) 1: 67
Hudsonian Orogeny: Proterozoic collisional tectonism in the Trans-Hudson Orogen, Saskatchewan
(Bickford, M. E., *et al.*) 1: 14
Penokean Orogeny: Rapid growth and strain rates inferred from syn-kinematic garnets, Penokean Orogeny, Minnesota
(Holm, Daniel K., *et al.*) 2: 166
plate collision: Delamination in collisional orogens
(Sacks, Paul E., *et al.*) 10: 999
— Two-sided orogen; collision and erosion from the sandbox to the Southern Alps, New Zealand
(Koons, P. O.) 8: 679

orogeny—periodicity
Ouachita Orogeny: Evolution of antivergent folds on a Paleozoic accretionary prism, Arkansas; an alternative view
(Babaei, Abdolali) 10: 987

Ostracoda *see also* ostracods

ostracods—biochemistry
magnesium: Magnesium-salinity relation in the saline lake ostracode Cyprideis americana
(Teeter, James W., *et al.*) 3: 220

ostracods—biostratigraphy
Pliocene: High eustatic sea level during the middle Pliocene; evidence from the Southeastern U.S. Atlantic Coastal Plain; with Suppl. Data 90-13
(Dowsett, Harry J., *et al.*) 5: 435

oxygen—geochemistry
paleoatmosphere: Lignin, land plants, and fungi; biological evolution affecting Phanerozoic oxygen balance
(Robinson, Jennifer M.) 7: 607

oxygen—isotopes
O-18/O-16: Channelized fluid flow through shear zones during fluid-enhanced dynamic recrystallization, Northern Apennines, Italy
(Carter, Karen E., *et al.*) 8: 720
— Did major changes in the stable-isotope composition of Proterozoic seawater occur?
(Burdett, J. W., *et al.*) 3: 227
— Dolomite formation in anoxic sediments of Kau Bay, Indonesia
(Middelburg, Jack J., *et al.*) 5: 399
— High-paleolatitude Late Cretaceous paleotemperatures; new data from James Ross Island, Antarctica
(Pirrie, D., *et al.*) 1: 31
— Hydrothermal dolomitization of Jurassic-Cretaceous limestones in the Southern Alps (Italy); relation to tectonics and volcanism
(Cervato, Cinzia) 5: 458
— Intracrystalline carbon and oxygen isotope variations in calcite revealed by laser microsampling
(Dickson, J. A. D., *et al.*) 9: 809
— Oxygen isotope geochemistry of the silicic volcanic rocks of the Etendeka-Parana Province; source constraints
(Harris, Chris, *et al.*) 11: 1119
— Response of Th/U in deep Labrador Sea sediments (ODP Site 646) to changes in sedimentation rates and paleoproductivities
(Hillaire-Marcel, C., *et al.*) 2: 162
— Stable isotope evidence for foraminiferal habitats during the development of the Cenomanian/Turonian oceanic anoxic event; with Suppl. Data 90-07
(Corfield, R. M., *et al.*) 2: 175

P-T conditions *see under* metamorphism; *see under* prograde metamorphism *under* metamorphism; *see under* retrograde metamorphism *under* metamorphism

Pacific Coast *see also* the individual states and provinces

Pacific Coast—tectonophysics
crust: U.S. west coast revisited; an aeromagnetic perspective
(Johnson, Peter R., *et al.*) 4: 332

Pacific Ocean—geochemistry
mantle: Chemistry of seamounts near the East Pacific Rise; implications for the geometry of subaxial mantle flow
(Batiza, Rodey, *et al.*) 11: 1122
trace elements: Rare earth element geochemistry of massive sulfides-sulfates and gossans on the Southern Explorer Ridge
(Barrett, Timothy J., *et al.*) 7: 583

Pacific Ocean—geophysical surveys
acoustical surveys: Causes of variation in fault-facing direction on the ocean floor
(Carbotte, Suzanne M., *et al.*) 8: 749
seismic surveys: Deep, high-amplitude reflections from a major shear zone above the subducting Juan de Fuca Plate
(Calvert, A. J., *et al.*) 11: 1091
— Oceanic rift propagation; a cause of crustal underplating and seamount volcanism
(Calvert, A. J., *et al.*) 9: 886
surveys: Role of ridge jumps and ridge propagation in the tectonic evolution of the Lau back-arc basin, Southwest Pacific
(Parson, L. M., *et al.*) 5: 470

Pacific Ocean—oceanography
ocean circulation: Holocene history of the El Nino phenomenon as recorded in flood sediments of northern coastal Peru
(Wells, Lisa E.) 11: 1134
ocean floors: Causes of variation in fault-facing direction on the ocean floor
(Carbotte, Suzanne M., *et al.*) 8: 749
— Chemistry of seamounts near the East Pacific Rise; implications for the geometry of subaxial mantle flow
(Batiza, Rodey, *et al.*) 11: 1122
— Mahukona; the missing Hawaiian volcano
(Garcia, Michael O., *et al.*) 11: 1111
reefs: Post-Miocene diagenetic and eustatic history of Enewetak Atoll; model and data comparison
(Quinn, Terrence M., *et al.*) 10: 942

Pacific Ocean—stratigraphy
Cretaceous: Brief reversed polarity interval during the Cretaceous normal polarity superchron
(Tarduno, John A.) 8: 683

Pacific Ocean—tectonophysics
plate tectonics: Alternative plate model for the early Miocene evolution of the Southwest Japan margin
(Hibbard, J. P., *et al.*) 2: 170
— Deep, high-amplitude reflections from a major shear zone above the subducting Juan de Fuca Plate
(Calvert, A. J., *et al.*) 11: 1091
— Subduction, arc reversal, and the origin of porphyry copper-gold deposits in island arcs
(Solomon, M.) 7: 630
sea-floor spreading: Causes of variation in fault-facing direction on the ocean floor
(Carbotte, Suzanne M., *et al.*) 8: 749
— Major off-axis hydrothermal activity on the northern Gorda Ridge
(Rona, Peter A., *et al.*) 6: 493
— Oceanic rift propagation; a cause of crustal underplating and seamount volcanism
(Calvert, A. J., *et al.*) 9: 886
— Role of ridge jumps and ridge propagation in the tectonic evolution of the Lau back-arc basin, Southwest Pacific
(Parson, L. M., *et al.*) 5: 470

Pacific region *see also* the individual countries

Pacific region—tectonophysics
plate tectonics: Late Oligocene-early Miocene major tectonic crisis and related basins in Bolivia
(Sempere, Thierry, *et al.*) 10: 946

Paleocene *see also under* stratigraphy *under* India; Montana; Texas

paleoclimatology—Cretaceous
Antarctica: High-paleolatitude Late Cretaceous paleotemperatures; new data from James Ross Island, Antarctica
(Pirrie, D., *et al.*) 1: 31

paleoclimatology—cycles
effects: Paleoclimate controls on stratigraphic repetition of chemical and siliciclastic rocks
(Cecil, C. Blaine) 6: 533

paleoclimatology—Holocene
Great Plains: Channel trenching and climatic change in the Southern U.S. Great Plains; with Suppl. Data 90-09
(Hall, Stephen A.) 4: 342
Peru: Holocene history of the El Nino phenomenon as recorded in flood sediments of northern coastal Peru
(Wells, Lisa E.) 11: 1134
Sahara: Across an early Holocene humid phase in western Sahara; pollen and isotope stratigraphy
(Lezine, Anne-Marie, *et al.*) 3: 264

paleoclimatology—Miocene
global: Phosphogenesis and weathering of shelf sediments from the Southeastern United States; implications for Miocene $\delta^{13}C$ excursions and global cooling
(Compton, John S., *et al.*) 12: 1227
Maryland: Late Tertiary floral assemblage from upland gravel deposits of the southern Maryland coastal plain
(McCartan, Lucy, *et al.*) 4: 311

paleoclimatology—paleotemperature
models: "Equable" climates during Earth history?
(Sloan, L. Cirbus, *et al.*) 6: 489

paleoclimatology—Pliocene
Southeastern U.S.: High eustatic sea level during the middle Pliocene; evidence from the Southeastern U.S. Atlantic Coastal Plain; with Suppl. Data 90-13
(Dowsett, Harry J., *et al.*) 5: 435

paleoclimatology—Quaternary
Alaska: Paleoclimatic forcing of magnetic susceptibility variations in Alaskan loess during the late Quaternary
(Beget, James E., *et al.*) 1: 40
Colorado: Stratigraphic evidence for late Quaternary dune activity near Hudson on the Piedmont of northern Colorado
(Forman, Steven L., *et al.*) 8: 745
Nevada: Soil-forming intervals caused by eolian sediment pulses in the Lahontan Basin, northwestern Nevada
(Chadwick, Oliver A., *et al.*) 3: 243

paleoclimatology—Triassic
Alps: Metamorphosed weathering horizon from the Oetztal-Stubai crystalline complex (Eastern Alps, Austria)
(Krois, Peter, *et al.*) 11: 1095

paleoecology—arthropods
Tertiary: Doomed pioneers; gravity-flow deposition and bioturbation in marine oxygen-deficient environments
(Follmi, Karl B., *et al.*) 11: 1069

paleoecology—conodonts
marine environment: Gravitational settling of conodont elements; implications for paleoecologic interpretations of conodont assemblages
(Broadhead, Thomas W., *et al.*) 9: 850

paleoecology—foraminifers
Cretaceous: Stable isotope evidence for foraminiferal habitats during the development of the Cenomanian/Turonian oceanic anoxic event; with Suppl. Data 90-07
(Corfield, R. M., *et al.*) 2: 175

paleoecology—Holocene
Bahamas: Magnesium-salinity relation in the saline lake ostracode Cyprideis americana
(Teeter, James W., *et al.*) 3: 220
— Stable-isotope record of organic carbon from an evolving carbonate banktop, Bight of Abaco, Bahamas
(Rasmussen, Kenneth A., *et al.*) 8: 790
Sahara: Across an early Holocene humid phase in western Sahara; pollen and isotope stratigraphy
(Lezine, Anne-Marie, *et al.*) 3: 264

paleoecology—invertebrates
Eocene: Eocene deep-sea communities in localized limestones formed by subduction-related methane seeps, southwestern Washington
(Goedert, James L., *et al.*) 12: 1182

paleoecology—Mississippian
Utah: Delle Phosphatic Member; an anomalous phosphatic interval in the Mississippian (Osagean-Meramecian) shelf sequence of central Utah
(Nichols, K. M., *et al.*) 1: 46

paleoecology—plants
Phanerozoic: Lignin, land plants, and fungi; biological evolution affecting Phanerozoic oxygen balance
(Robinson, Jennifer M.) 7: 607

paleoecology—Quaternary
Atlantic Ocean: Response of Th/U in deep Labrador Sea sediments (ODP Site 646) to changes in sedimentation rates and paleoproductivities
(Hillaire-Marcel, C., *et al.*) 2: 162

Paleogene *see also under* stratigraphy *under* Nevada; Wyoming

Paleogene—stratigraphy
boundary: Kara and Ust-Kara impact structures (USSR) and their relevance to the K/T boundary event
(Koeberl, Christian, *et al.*) 1: 50
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; discussion
(Kyte, Frank T.) 1: 87
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; discussion
(Bohor, Bruce F.) 1: 88
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; reply
(Schmitz, Birger) 1: 89
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; discussion
(Triplehorn, D. M.) 1: 92
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; reply
(Schmitz, Birger) 1: 93

paleogeography *see also under* stratigraphy *under* Ordovician; Phanerozoic

paleogeography—Carboniferous
Northern Hemisphere: Probable influence of Early Carboniferous (Tournaisian-early Visean) geography on the development of Waulsortian and Waulsortian-like mounds
(King, David T., Jr.) 7: 591

paleogeography—Cenozoic
Arizona: Regional significance of recurrent faulting and intracanyon volcanism at Oak Creek canyon, southern Colorado Plateau, Arizona; with Suppl. Data 90-23
(Holm, Richard F., *et al.*) 10: 1014

paleogeography—Cretaceous
Atlantic Ocean: Early Cretaceous shelf-edge deltas of the Baltimore Canyon Trough; principal sources for sediment gravity deposits of the northern Hatteras Basin
(Poag, C. Wylie, *et al.*) 2: 149
Nevada: Cretaceous to early Tertiary paleogeography in the hinterland of the Sevier thrust belt, east-central Nevada
(Vandervoort, Dirk S., *et al.*) 6: 567

paleogeography—Devonian
Gondwana: Ocean currents and unconformities; the North Gondwana Middle Devonian
(Oczlon, Martin S.) 6: 509

paleogeography—Jurassic
New Mexico: Hydrogeology of an ancient arid closed basin; implications for tabular sandstone-hosted uranium deposits
(Sanford, Richard F.) 11: 1099

paleogeography—Mesozoic
Alps: Mesozoic paleogeography of the northern Calcareous Alps; evidence from paleomagnetism and facies analysis
(Channell, J. E. T., *et al.*) 9: 828

paleogeography—Miocene
Southeastern U.S.: Phosphogenesis and weathering of shelf sediments from the Southeastern United States; implications for Miocene $\delta^{13}C$ excursions and global cooling
(Compton, John S., *et al.*) 12: 1227

paleogeography—Mississippian
Utah: Delle Phosphatic Member; an anomalous phosphatic interval in the Mississippian (Osagean-Meramecian) shelf sequence of central Utah
(Nichols, K. M., *et al.*) 1: 46

paleogeography—Oligocene
Wyoming: Early Oligocene paleovalleys in southern and central Wyoming; evidence of high local relief on the late Eocene unconformity
(Evanoff, Emmett) 5: 443

paleogeography—Ordovician
Atlantic region: Sedimentological evidence for a limited separation between Armorica and Gondwana during the Early Ordovician
(Noblet, C., *et al.*) 4: 303

paleogeography—Paleogene
Nevada: Cretaceous to early Tertiary paleogeography in the hinterland of the Sevier thrust belt, east-central Nevada
(Vandervoort, Dirk S., *et al.*) 6: 567

paleogeography—Paleozoic
Newfoundland: Early Paleozoic paleogeography and accretionary history of the Newfoundland Appalachians
(van der Pluijm, Ben A., *et al.*) 9: 898

paleogeography—Pennsylvanian
Oklahoma: Middle Pennsylvanian recurrent uplift of the Ouachita fold belt and basin subsidence in the Arkoma Basin, Oklahoma
(Elmore, R. Douglas, *et al.*) 9: 906

paleogeography—Phanerozoic
Tethys: Tethys, Thetis, Thethys, or Thetys? What, where, and when was it?; discussion
(Sengor, A. M. C.) 6: 575
— Tethys, Thetis, Thethys, or Thetys? What, where, and when was it?; reply
(Tozer, E. T.) 6: 575

paleogeography—Pleistocene
British Columbia: Thick and fast; sedimentation in a Pleistocene fiord lake of British Columbia, Canada
(Eyles, Nicholas, *et al.*) 11: 1153

paleogeography—Pliocene
Southeastern U.S.: High eustatic sea level during the middle Pliocene; evidence from the Southeastern U.S. Atlantic Coastal Plain; with Suppl. Data 90-13
(Dowsett, Harry J., *et al.*) 5: 435

paleogeography—Proterozoic
Asia: Proterozoic supercontinent, its latest Precambrian rifting, breakup, dispersal into small continents, and subsidence of their margins; evidence from Asia
(Ilyin, A. V.) 12: 1231
Queensland: Recognition of high-frequency sea-level fluctuations in Proterozoic siliciclastic tidal deposits, Mount Isa, Australia
(Eriksson, Kenneth A., *et al.*) 5: 474

paleogeography—Quaternary
Nevada: Soil-forming intervals caused by eolian sediment pulses in the Lahontan Basin, northwestern Nevada
(Chadwick, Oliver A., *et al.*) 3: 243

paleomagnetism *see under* geochronology

paleomagnetism—Cretaceous
British Columbia: Discordant paleomagnetic poles from the Canadian Coast Plutonic Complex; regional tilt rather than large-scale displacement? discussion
(Umhoefer, Paul J., *et al.*) 8: 800
— Discordant paleomagnetic poles from the Canadian Coast Plutonic Complex; regional tilt rather than large-scale displacement? reply
(Butler, R. F., *et al.*) 8: 801
— Discordant paleomagnetic poles from the Canadian Coast Plutonic Complex; regional tilt rather than large displacement? discussion
(Miller, Robert B., *et al.*) 11: 1164
— Discordant paleomagnetic poles from the Canadian Coast Plutonic Complex; regional tilt rather than large displacement? reply
(Butler, R. F., *et al.*) 11: 1165
global: Brief reversed polarity interval during the Cretaceous normal polarity superchron
(Tarduno, John A.) 8: 683

paleomagnetism—Devonian
Western Australia: Magnetostratigraphy, Late Devonian iridium anomaly, and impact hypotheses
(Hurley, Neil F., *et al.*) 4: 291

paleomagnetism—magnetic susceptibility
plutonic rocks: Nested granites in question; contrasted emplacement kinematics of independent magmas in the Zaer Pluton, Morocco
(Bouchez, Jean Luc, *et al.*) 10: 966

paleomagnetism—Miocene
Nevada: Paleomagnetic evidence for counterclockwise block rotation in the North Nevada rift region
(Li, Yianping, *et al.*) 1: 79

paleomagnetism—Paleozoic
Newfoundland: Early Paleozoic paleogeography and accretionary history of the Newfoundland Appalachians
(van der Pluijm, Ben A., *et al.*) 9: 898

paleomagnetism—Permian
Oklahoma: Remagnetization of the Rush Springs Formation, Cement, Oklahoma; implications for dating hydrocarbon migration and aeromagnetic exploration
(Elmore, R. Douglas, *et al.*) 2: 124
Prince Edward Island: Early Permian pole; evidence from the Pictou red beds, Prince Edward Island, Canada
(Symons, D. T. A.) 3: 234

paleomagnetism—Quaternary
Alaska: Paleoclimatic forcing of magnetic susceptibility variations in Alaskan loess during the late Quaternary
(Beget, James E., *et al.*) 1: 40

Paleosols *see under* dates *under* absolute age; *see under* soils *under* Texas; *see under* thermoluminescence *under* geochronology

paleotemperature *see* geologic thermometry *under* fluid inclusions

Paleozoic *see also* Carboniferous; Devonian; Ordovician; *see also under* stratigraphy *under* Appalachians; Newfoundland; Nova Scotia; Tennessee

paleozoogeography *see* biogeography

palladium—geochemistry
ore-forming fluids: Speciation and solubility of palladium in aqueous magmatic-hydrothermal solutions
(Sassani, David C., *et al.*) 10: 925

palynology *see also* micropaleontology

palynomorphs—biochemistry
isotopes: Response of Th/U in deep Labrador Sea sediments (ODP Site 646) to changes in sedimentation rates and paleoproductivities
(Hillaire-Marcel, C., *et al.*) 2: 162

palynomorphs—biostratigraphy
Quaternary: Paleoclimatic forcing of magnetic susceptibility variations in Alaskan loess during the late Quaternary
(Beget, James E., *et al.*) 1: 40

palynomorphs—miospores
Cretaceous: Reworking of Cretaceous dinosaurs into Paleocene channel deposits, upper Heil Creek Formation, Montana
(Lofgren, Donald L., *et al.*) 9: 874
Holocene: Across an early Holocene humid phase in western Sahara; pollen and isotope stratigraphy
(Lezine, Anne-Marie, *et al.*) 3: 264

Panama—structural geology
neotectonics: Model for late Neogene deformation in Panama
(Mann, Paul, *et al.*) 6: 558

Papua New Guinea—economic geology
copper ores: Subduction, arc reversal, and the origin of porphyry copper-gold deposits in island arcs
(Solomon, M.) 7: 630
gold ores: Subduction, arc reversal, and the origin of porphyry copper-gold deposits in island arcs
(Solomon, M.) 7: 630

Papua New Guinea—tectonophysics
plate tectonics: Intraplate-type magmatism in a continent–island-arc collision zone; Porgera intrusive complex, Papua New Guinea
(Richards, Jeremy P., *et al.*) 10: 958

Pennsylvania—economic geology
coal: Hydrothermal alteration in anthracite from eastern Pennsylvania; implications for mechanisms of anthracite formation
(Daniels, Eric J., *et al.*) 3: 247

Pennsylvania—geochronology
Jurassic: U/Pb zircon and baddeleyite ages for the Palisades and Gettysburg sills of the northeastern United States; implications for the age of the Triassic/Jurassic boundary
(Dunning, G. R., *et al.*) 8: 795
Triassic: U/Pb zircon and baddeleyite ages for the Palisades and Gettysburg sills of the northeastern United States; implications for the age of the Triassic/Jurassic boundary
(Dunning, G. R., *et al.*) 8: 795

Pennsylvania—petrology
intrusions: Palisades Sill; origin of the olivine zone by separate magmatic injection rather than gravity settling
(Husch, Jonathan M.) 8: 699

Pennsylvanian *see also* Carboniferous; *see also under* geochronology *under* North America; *see also under* stratigraphy *under* Appalachians; Oklahoma

peridotites *see under* igneous rocks

Permian *see also under* stratigraphy *under* Kansas; Oklahoma; Prince Edward Island

Persian Gulf—geochemistry
isotopes: Abu Dhabi Sabkha, Persian Gulf, revisited; application of strontium isotopes to test an early dolomitization model
(Muller, Daniel W., *et al.*) 7: 618

Peru—geochronology
Holocene: Holocene history of the El Nino phenomenon as recorded in flood sediments of northern coastal Peru
(Wells, Lisa E.) 11: 1134

petroleum *see also under* economic geology *under* France; New Zealand; North Sea; Oklahoma

petroleum—genesis
models: Pb-Pb dating of hydrocarbon migration into a bitumen-bearing ore deposit, North Wales
(Parnell, John, *et al.*) 10: 1028

Phanerozoic *see also* Carboniferous; Cenozoic; Cretaceous; Devonian; Eocene; Mesozoic; Ordovician; Paleogene; Tertiary

Phanerozoic—stratigraphy
paleoecology: Lignin, land plants, and fungi; biological evolution affecting Phanerozoic oxygen balance
(Robinson, Jennifer M.) 7: 607
paleogeography: Tethys, Thetis, Thethys, or Thetys? What, where, and when was it?; discussion
(Sengor, A. M. C.) 6: 575
— Tethys, Thetis, Thethys, or Thetys? What, where, and when was it?; reply
(Tozer, E. T.) 6: 575

phase equilibria—experimental studies
CaO-MgO-SiO_2-CO_2: Experimental study bearing on the absence of carbonate in mantle-derived xenoliths
(Canil, Dante) 10: 1011

phase equilibria—interpretation
C-O-H: Bleaching of limestones in the Notch Peak contact-metamorphic aureole, Utah
(Todd, Clifford S.) 1: 83

phase equilibria—peridotites
experimental studies: Solidus of carbonated fertile peridotite under fluid-saturated conditions
(Falloon, Trevor J., *et al.*) 3: 195

phase equilibria—theoretical studies
ore-forming fluids: Speciation and solubility of palladium in aqueous magmatic-hydrothermal solutions
(Sassani, David C., *et al.*) 10: 925

Philippine Islands—economic geology
copper ores: Subduction, arc reversal, and the origin of porphyry copper-gold deposits in island arcs
(Solomon, M.) 7: 630
gold ores: Subduction, arc reversal, and the origin of porphyry copper-gold deposits in island arcs
(Solomon, M.) 7: 630

phosphate deposits *see also under* economic geology *under* Southeastern U.S.

physical geography *see* geomorphology

planetology *see also* Mars; Moon; Venus

Plantae *see also* algal flora; ichnofossils; palynomorphs; problematic fossils

plants—biostratigraphy
Miocene: Late Tertiary floral assemblage from upland gravel deposits of the southern Maryland coastal plain
(McCartan, Lucy, *et al.*) 4: 311

plants—paleoecology
Phanerozoic: Lignin, land plants, and fungi; biological evolution affecting Phanerozoic oxygen balance
(Robinson, Jennifer M.) 7: 607

plate tectonics *see also under* tectonophysics *under* Appalachians; Asia; Australia; Barbados; Burma; Caribbean region; Eurasia; Europe; Himalayas; India; Indonesia; Japan; Mediterranean region; New Zealand; North America; Pacific Ocean; Pacific region; Papua New Guinea; Precambrian; Red Sea region; South Australia; Victoria; Washington

plate tectonics—age
Precambrian: Length of the global plate boundary at 2.4 Ga
(Abbott, Dallas, *et al.*) 1: 58

plate tectonics—effects
metallogeny: Geodynamic setting of mesothermal gold deposits; an association with accretionary tectonic regimes
(Kerrich, Robert, *et al.*) 9: 882

plate tectonics—island arcs
metallogeny: Integrated tectonic-genetic model for volcanic-hosted massive sulfide deposits
(Sawkins, Frederick J.) 11: 1061

plate tectonics—mechanism
plate collision: Delamination in collisional orogens
(Sacks, Paul E., *et al.*) 10: 999

plate tectonics—movement
plate convergence: Transpression, orogenic float, and lithospheric balance
(Oldow, John S., *et al.*) 10: 991

plate tectonics—rifting
effects: Generating melt during lithospheric extension; pure shear vs. simple shear
(Latin, Dave, *et al.*) 4: 327
evolution: Two-stage rifting of Pangea by two different mechanisms
(Hynes, Andrew) 4: 323

plate tectonics—subduction
mechanism: On the mechanical role of smectite in subduction zones
(Vrolijk, Peter) 8: 703

platinum—geochemistry
shale: Acraman impact ejecta and host shales; evidence for low-temperature mobilization of iridium and other platinoids
(Wallace, Malcolm W., *et al.*) 2: 132

platinum ores—genesis
ore transport: Speciation and solubility of palladium in aqueous magmatic-hydrothermal solutions
(Sassani, David C., *et al.*) 10: 925

Pleistocene *see also under* geochronology *under* Alaska; Cyprus; *see also under* stratigraphy *under* British Columbia; Ohio

Pliocene *see also under* geochronology *under* Alaska; *see also under* stratigraphy *under* North Carolina; South Carolina

plutons *see under* intrusions

polymetallic ores *see also* gold ores

Precambrian *see also* Proterozoic; *see also under* geochronology *under* Turkey

Precambrian—stratigraphy
chronostratigraphy: Precambrian time units and nomenclature; the geon concept
(Hofmann, H. J.) 4: 340

Precambrian—tectonophysics
plate tectonics: Length of the global plate boundary at 2.4 Ga
(Abbott, Dallas, *et al.*) 1: 58

pressure *see under* mechanism *under* diagenesis

Prince Edward Island—stratigraphy
Permian: Early Permian pole; evidence from the Pictou red beds, Prince Edward Island, Canada
(Symons, D. T. A.) 3: 234

problematic fossils—biostratigraphy
Proterozoic: Ediacaran remains from intertillite beds in northwestern Canada
(Hofmann, H. J., *et al.*) 12: 1199

Proterozoic *see also* Precambrian; *see also under* geochronology *under* Alaska; Egypt; Israel; *see also under* stratigraphy *under* Asia; Northwest Territories; Nova Scotia; Queensland; Red Sea region

Proterozoic—stratigraphy
chronostratigraphy: Precambrian time units and nomenclature; the geon concept
(Hofmann, H. J.) 4: 340
paleo-oceanography: Did major changes in the stable-isotope composition of Proterozoic seawater occur?
(Burdett, J. W., *et al.*) 3: 227

Pyrenees *see also* France; Spain

pyroclastics *see under* igneous rocks

quartz *see under* framework silicates, silica minerals *under* crystal growth

Quaternary *see also under* geochronology *under* China; *see also under* stratigraphy *under* Alaska; Colorado; Nevada

Quebec—geochronology
Archean: Dating Archean metamorphic minerals southeast of the Grenville Front, western Quebec, using Pb isotopes
(Gariepy, Clement, *et al.*) 11: 1078

Quebec—geophysical surveys
seismic surveys: Southern Abitibi greenstone belt; Archean crustal structure from seismic-reflection profiles
(Jackson, S. L., *et al.*) 11: 1086

Quebec—seismology
earthquakes: 2300 yr history of seismicity from silting events in Lake Tadoussac, Charlevoix, Quebec
(Doig, Ronald) 9: 820

Quebec—stratigraphy
Holocene: 2300 yr history of seismicity from silting events in Lake Tadoussac, Charlevoix, Quebec
(Doig, Ronald) 9: 820

Quebec—structural geology
tectonics: Geobarometry, differential block movements, and crustal structure of the southwestern Abitibi greenstone belt, Canada
(Feng, Rui, *et al.*) 9: 870

Queensland—stratigraphy
Proterozoic: Recognition of high-frequency sea-level fluctuations in Proterozoic siliciclastic tidal deposits, Mount Isa, Australia
(Eriksson, Kenneth A., *et al.*) 5: 474

radioactive dating *see* absolute age

radiocarbon dating *see* absolute age

radiolarians—biostratigraphy
Jurassic: Implications of new Jurassic stratigraphic, geochronometric, and paleolatitudinal data from the western Klamath Terrane (Smith River and Rogue Valley subterranes)
(Pessagno, Emile A., Jr., *et al.*) 7: 665

rare earths *see also* neodymium

rare earths—geochemistry
basalts: Modified Gulf of California model for South Georgia, North Scotia Ridge, and implications for the Rocas Verdes back-arc basin, Southern Andes
(Alabaster, T., *et al.*) 6: 497
chert: Rare earth elements as indicators of different marine depositional environments in chert and shale
(Murray, Richard W., *et al.*) 3: 268
clinopyroxene: Shear zones in the upper mantle; relationship between geochemical enrichment and deformation in mantle peridotites
(Downes, H.) 4: 374
igneous rocks: Intraplate-type magmatism in a continent–island-arc collision zone; Porgera intrusive complex, Papua New Guinea
(Richards, Jeremy P., *et al.*) 10: 958
lunar samples: Reading the Moon's volcanic record by ion microprobe analysis of Apollo 14 glass beads
(Papike, J. J., *et al.*) 4: 295
sulfides: Rare earth element geochemistry of massive sulfides-sulfates and gossans on the Southern Explorer Ridge
(Barrett, Timothy J., *et al.*) 7: 583
volcanic rocks: Geochemistry of high-potassium rocks from the mid-Tertiary Guffey volcanic center, Thirtynine Mile volcanic field, central Colorado; with Suppl. Data 90-15
(Wobus, Reinhard A., *et al.*) 7: 642

rare gases *see* noble gases

Red Sea—geochemistry
carbon: Extreme ^{13}C depletions in seawater-derived brines and their implications for the past geochemical carbon cycle
(Lazar, Boaz, *et al.*) 12: 1191

Red Sea region—stratigraphy
Proterozoic: Use and abuse of crustal accretion calculations
(Pallister, John S., *et al.*) 1: 35
— Use and abuse of crustal accretion calculations; discussion
(Church, W. R.) 12: 1258
— Use and abuse of crustal accretion calculations; reply
(Pallister, John S., *et al.*) 12: 1259

Red Sea region—tectonophysics
plate tectonics: Orientation of late Precambrian sutures in the Arabian-Nubian shield
(Stern, Robert J., *et al.*) 11: 1103

reefs *see also under* oceanography *under* Indian Ocean; Pacific Ocean

regional geology *see* areal geology under the appropriate area term

remote sensing *see also* geophysical methods; *see also under* geophysical surveys *under* Argentina; Italy; Spitsbergen

reptiles—dinosaurs
Cretaceous: Reworking of Cretaceous dinosaurs into Paleocene channel deposits, upper Hell Creek Formation, Montana
(Lofgren, Donald L., *et al.*) 9: 874

Reptilia *see also* reptiles

rhyolites *see under* igneous rocks

rift zones *see under* systems *under* faults

rock mechanics—materials, properties
sedimentary rocks: Diapiric origin of the Blytheville and Pascola arches in the Reelfoot Rift, east-central United States; relation to New Madrid seismicity
(McKeown, F. A., *et al.*) 11: 1158

Rocky Mountains *see also* the individual states and provinces
Russia *see* USSR
Sahara *see also* the individual countries
Sahara—stratigraphy
Holocene: Across an early Holocene humid phase in western Sahara; pollen and isotope stratigraphy
(Lezine, Anne-Marie, *et al.*) 3: 264
salt tectonics *see also under* structural geology *under* Gulf Coastal Plain
sandstone *see also under* clastic rocks *under* sedimentary rocks
Saskatchewan—geomorphology
glacial geology: Drumlins, subglacial meltwater floods, and ocean responses; discussion
(Forsstrom, Lars) 8: 804
— Drumlins, subglacial meltwater floods, and ocean responses; reply
(Shaw, John) 8: 804
Saskatchewan—structural geology
tectonics: Proterozoic collisional tectonism in the Trans-Hudson Orogen, Saskatchewan
(Bickford, M. E., *et al.*) 1: 14
Scandinavia—tectonophysics
crust: Deformation of the Baltic continental crust during Caledonide intracontinental subduction; views from seismic reflection data; discussion
(Hauser, Ernest C.) 6: 578
— Deformation of the Baltic continental crust during Caledonide intracontinental subduction; views from seismic reflection data; reply
(Hurich, C. A., *et al.*) 6: 579
Scotland—sedimentary petrology
sedimentary structures: Sand-drift surfaces; a neglected type of bounding surface
(Clemmensen, Lars B., *et al.*) 11: 1142
sea-floor spreading *see also* continental drift; plate tectonics; *see also under* tectonophysics *under* Pacific Ocean
sea-level fluctuations *see* changes of level
sea water—geochemistry
carbon: Extreme ^{13}C depletions in seawater-derived brines and their implications for the past geochemical carbon cycle
(Lazar, Boaz, *et al.*) 12: 1191
sedimentary rocks *see also* sedimentary structures; sedimentation; sediments
sedimentary rocks—carbonate rocks
alteration: Bleaching of limestones in the Notch Peak contact-metamorphic aureole, Utah
(Todd, Clifford S.) 1: 83
geochemistry: Did major changes in the stable-isotope composition of Proterozoic seawater occur?
(Burdett, J. W., *et al.*) 3: 227
limestone: Hydrothermal dolomitization of Jurassic-Cretaceous limestones in the Southern Alps (Italy); relation to tectonics and volcanism
(Cervato, Cinzia) 5: 458
lithofacies: Mesozoic paleogeography of the northern Calcareous Alps; evidence from paleomagnetism and facies analysis
(Channell, J. E. T., *et al.*) 9: 828
micrite: New microtextural criterion for differentiation of compaction and early cementation in fine-grained limestones
(Lasemi, Zakaria, *et al.*) 4: 370
sedimentary rocks—chemically precipitated rocks
chert: Bent chert tubes in the Phosphoria Formation of Wyoming; pressure solution strain markers
(Scotford, David M., *et al.*) 9: 846
diagenesis: Evidence for episodic basin dewatering in salt-dome cap rocks
(Hallager, W. S., *et al.*) 8: 716
environmental analysis: Halite depositional facies in a solar salt pond; a key to interpreting physical energy and water depth in ancient deposits?
(Handford, C. Robertson) 8: 691
gypsum: Diagenetic, nonevaporative origin for gypsum
(Bain, Roger J.) 5: 447
phosphate rocks: Delle Phosphatic Member; an anomalous phosphatic interval in the Mississippian (Osagean-Meramecian) shelf sequence of central Utah
(Nichols, K. M., *et al.*) 1: 46
— Phosphogenesis and weathering of shelf sediments from the Southeastern United States; implications for Miocene $\delta^{13}C$ excursions and global cooling
(Compton, John S., *et al.*) 12: 1227
sedimentary rocks—clastic rocks
conglomerate: Pebbles from Barkerville and Slide Mountain terranes in a Quesnel Terrane conglomerate; evidence for pre-Jurassic deformation of the Barkerville and Slide Mountain terranes
(McMullin, David W. A., *et al.*) 10: 962
diagenesis: Carbon dioxide in clastic rocks and silicate hydrolysis
(Hutcheon, Ian, *et al.*) 6: 541
lithofacies: Recognition of high-frequency sea-level fluctuations in Proterozoic siliciclastic tidal deposits, Mount Isa, Australia
(Eriksson, Kenneth A., *et al.*) 5: 474
— Stratigraphic modeling of foreland basins; interpreting thrust deformation and lithosphere rheology
(Flemings, Peter B., *et al.*) 5: 430
provenance: Middle Pennsylvanian recurrent uplift of the Ouachita fold belt and basin subsidence in the Arkoma Basin, Oklahoma
(Elmore, R. Douglas, *et al.*) 9: 906
— Overlooked sedimentary particles from tropical weathering environments
(Johnsson, Mark J.) 2: 107
— $^{40}Ar/^{39}Ar$ laser-probe dating of detrital micas from the Montgomery Creek Formation, Northern California; clues to provenance, tectonics, and weathering processes
(Renne, Paul R., *et al.*) 6: 563
quartz arenite: Diagenetic quartzarenite and destruction of secondary porosity; an example from the Middle Jurassic Brent Sandstone of Northwest Europe; discussion
(Shanmugam, G.) 3: 287
— Diagenetic quartzarenite and destruction of secondary porosity; an example from the Middle Jurassic Brent Sandstone of Northwest Europe; reply
(Harris, Nicholas B.) 3: 288
— Diagenetic quartzarenite and destruction of secondary porosity; an example from the Middle Jurassic Brent Sandstone of Northwest Europe; discussion
(Scotchman, I. C.) 8: 799
— Diagenetic quartzarenite and destruction of secondary porosity; an example from the Middle Jurassic Brent Sandstone of Northwest Europe; reply
(Harris, Nicholas B.) 8: 799
sandstone: Actualistic sandstone petrofacies; discriminating modern and ancient source rocks
(Ingersoll, Raymond V.) 8: 733
— Ancient subaerial exposure and freshwater leaching in sandstones
(Emery, D., *et al.*) 12: 1178
— Linear coupling of carbon and strontium isotopes in Rotliegend Sandstone, North Sea; evidence for cross-formational fluid flow
(Sullivan, Morgan D., *et al.*) 12: 1215
— Sand-drift surfaces; a neglected type of bounding surface
(Clemmensen, Lars B., *et al.*) 11: 1142
shale: Acraman impact ejecta and host shales; evidence for low-temperature mobilization of iridium and other platinoids
(Wallace, Malcolm W., *et al.*) 2: 132
tempestite: Temporal variations in tempestite thickness may be a geologic record of atmospheric CO_2; discussion
(Woods, Arnold) 9: 910
— Temporal variations in tempestite thickness may be a geologic record of atmospheric CO_2; reply
(Brandt, Danita S., *et al.*) 9: 911
turbidite: Ediacaran remains from intertillite beds in northwestern Canada
(Hofmann, H. J., *et al.*) 12: 1199

sedimentary rocks—environmental analysis
marine environment: Rare earth elements as indicators of different marine depositional environments in chert and shale
(Murray, Richard W., *et al.*) 3: 268
terrestrial environment: Paleoclimate controls on stratigraphic repetition of chemical and siliciclastic rocks
(Cecil, C. Blaine) 6: 533

sedimentary rocks—geochemistry
trace elements: Channelized fluid flow through shear zones during fluid-enhanced dynamic recrystallization, Northern Apennines, Italy
(Carter, Karen E., *et al.*) 8: 720

sedimentary rocks—lithofacies
environmental analysis: Upper Cretaceous marl-limestone sequences of Alabama; possible products of sea-level change, not climate forcing
(King, David T., Jr.) 1: 19

sedimentary rocks—lithostratigraphy
Mississippian: Sequence stratigraphy and evolution of the Antler foreland basin, east-central Nevada
(Trexler, James H., Jr., *et al.*) 5: 422

sedimentary rocks—organic residues
anthracite: Hydrothermal alteration in anthracite from eastern Pennsylvania; implications for mechanisms of anthracite formation
(Daniels, Eric J., *et al.*) 3: 247

sedimentary structures *see also* sedimentary rocks; sediments

sedimentary structures—bedding plane irregularities
mounds: Probable influence of Early Carboniferous (Tournaisian-early Visean) geography on the development of Waulsortian and Waulsortian-like mounds
(King, David T., Jr.) 7: 591

sedimentary structures—biogenic structures
burrows: Doomed pioneers; gravity-flow deposition and bioturbation in marine oxygen-deficient environments
(Follmi, Karl B., *et al.*) 11: 1069

sedimentary structures—environmental analysis
shelf environment: Delle Phosphatic Member; an anomalous phosphatic interval in the Mississippian (Osagean-Meramecian) shelf sequence of central Utah
(Nichols, K. M., *et al.*) 1: 46

sedimentary structures—nomenclature
sand-drift surfaces: Sand-drift surfaces; a neglected type of bounding surface
(Clemmensen, Lars B., *et al.*) 11: 1142

sedimentary structures—planar bedding structures
channels: Channel trenching and climatic change in the Southern U.S. Great Plains; with Suppl. Data 90-09
(Hall, Stephen A.) 4: 342
cross-stratification: Angles of repose that exceed modern angles
(Mann, C. John, *et al.*) 4: 358
cyclothems: Middle Pennsylvanian recurrent uplift of the Ouachita fold belt and basin subsidence in the Arkoma Basin, Oklahoma
(Elmore, R. Douglas, *et al.*) 9: 906
— Pennsylvanian time scales and cycle periods
(Klein, George DeVries) 5: 455
laminations: Tidal drawdown; a mechanism for producing cyclic sediment laminations in glaciomarine deltas
(Smith, Norman D., *et al.*) 1: 10

sedimentary structures—secondary structures
concretions: Force of crystallization during the growth of siliceous concretions
(Dewers, Thomas, *et al.*) 3: 204

sedimentary structures—soft sediment deformation
slump structures: Slump strain indicative of paleoslope in Cretaceous Izumi sedimentary basin along Median Tectonic Line, Southwest Japan
(Miyata, Takao) 5: 392

sedimentary structures—theoretical studies
sedimentation: Angles of repose that exceed modern angles
(Mann, C. John, *et al.*) 4: 358

sedimentation—controls
tectonic controls: Development of coarse-grained facies in lacustrine rift basins; examples from East Africa
(Scholz, Christopher A., *et al.*) 2: 140
— Early history of the Michigan Basin; subsidence and Appalachian tectonics
(Howell, Paul D., *et al.*) 12: 1195
— Geologic history of the extensional basin of the Gulf of Corinth (?Miocene-Pleistocene), Greece; discussion
(Doutsos, Theodor, *et al.*) 12: 1256
— Geologic history of the extensional basin of the Gulf of Corinth (?Miocene-Pleistocene), Greece; reply
(Ori, Gian Gabriele) 12: 1256
— Mesozoic paleogeography of the northern Calcareous Alps; evidence from paleomagnetism and facies analysis
(Channell, J. E. T., *et al.*) 9: 828
— Middle Pennsylvanian recurrent uplift of the Ouachita fold belt and basin subsidence in the Arkoma Basin, Oklahoma
(Elmore, R. Douglas, *et al.*) 9: 906
— Morphology of the Frontal fault zone, Southwest Oklahoma; implications for deformation and deposition in the Wichita Uplift and Anadarko Basin; with Suppl. Data 90-16
(McConnell, David A., *et al.*) 7: 634
— Multiple detachment model for the early rifting stage of the late Proterozoic Damara Orogen in Namibia
(Henry, G., *et al.*) 1: 67
— Nested Paleozoic "successor" basins in the southern Appalachian Blue Ridge
(Tull, James F., *et al.*) 11: 1046
— Sequence stratigraphy and evolution of the Antler foreland basin, east-central Nevada
(Trexler, James H., Jr., *et al.*) 5: 422
— Transtensional arm of the early Mesozoic Fundy rift basin; penecontemporaneous faulting and sedimentation
(Olsen, Paul E., *et al.*) 8: 695

sedimentation—cyclic processes
detrital sedimentation: Episodic rapid uplift in the Himalaya revealed by $^{40}Ar/^{39}Ar$ analysis of detrital K-feldspar and muscovite, Bengal Fan
(Copeland, Peter, *et al.*) 4: 354
intertidal sedimentation: Recognition of high-frequency sea-level fluctuations in Proterozoic siliciclastic tidal deposits, Mount Isa, Australia
(Eriksson, Kenneth A., *et al.*) 5: 474
— Tidal drawdown; a mechanism for producing cyclic sediment laminations in glaciomarine deltas
(Smith, Norman D., *et al.*) 1: 10
lagoonal sedimentation: Stable-isotope record of organic carbon from an evolving carbonate banktop, Bight of Abaco, Bahamas
(Rasmussen, Kenneth A., *et al.*) 8: 790
marine sedimentation: Computer modeling the internal architecture of carbonate platforms
(Bosence, Dan, *et al.*) 1: 26
— Upper Cretaceous marl-limestone sequences of Alabama; possible products of sea-level change, not climate forcing
(King, David T., Jr.) 1: 19
terrestrial sedimentation: Paleoclimate controls on stratigraphic repetition of chemical and siliciclastic rocks
(Cecil, C. Blaine) 6: 533
— Stratigraphic modeling of foreland basins; interpreting thrust deformation and lithosphere rheology
(Flemings, Peter B., *et al.*) 5: 430

sedimentation—deposition
colluvium: Late Holocene erosion and colluvium deposition in Swaziland
(Dardis, George F.) 10: 934

sedimentation—diagenesis
glaciolacustrine environment: Diagenetic, nonevaporative origin for gypsum
(Bain, Roger J.) 5: 447
mixing: Preservation potential of sedimentary event layers
(Wheatcroft, Robert A.) 9: 843

reefs: Post-Miocene diagenetic and eustatic history of Enewetak Atoll; model and data comparison
(Quinn, Terrence M., *et al.*) 10: 942
sedimentation—environment
marine environment: Rare earth elements as indicators of different marine depositional environments in chert and shale
(Murray, Richard W., *et al.*) 3: 268
shallow-water environment: Halite depositional facies in a solar salt pond; a key to interpreting physical energy and water depth in ancient deposits?
(Handford, C. Robertson) 8: 691
shelf environment: Phosphogenesis and weathering of shelf sediments from the Southeastern United States; implications for Miocene $\delta^{13}C$ excursions and global cooling
(Compton, John S., *et al.*) 12: 1227
slope environment: Slump strain indicative of paleoslope in Cretaceous Izumi sedimentary basin along Median Tectonic Line, Southwest Japan
(Miyata, Takao) 5: 392
storm environment: Temporal variations in tempestite thickness may be a geologic record of atmospheric CO_2; discussion
(Woods, Arnold) 9: 910
— Temporal variations in tempestite thickness may be a geologic record of atmospheric CO_2; reply
(Brandt, Danita S., *et al.*) 9: 911
sedimentation—processes
biochemical sedimentation: Cyanobacterial precipitation of gypsum, calcite, and magnesite from natural alkaline lake water
(Thompson, J. B., *et al.*) 10: 995
bioclastic sedimentation: Doomed pioneers; gravity-flow deposition and bioturbation in marine oxygen-deficient environments
(Follmi, Karl B., *et al.*) 11: 1069
— Gravitational settling of conodont elements; implications for paleoecologic interpretations of conodont assemblages
(Broadhead, Thomas W., *et al.*) 9: 850
detrital sedimentation: Fluvial response to debris associated with mass wasting during extreme floods
(Miller, Andrew J.) 7: 599
fluvial sedimentation: Lithologic mixing in a modern foreland basin; evidence from Landsat thematic mapper images
(Damanti, John F.) 9: 835
glacial sedimentation: Genetic till prism
(Hicock, Stephen R.) 6: 517
— Macrofabrics and quartz microstructures confirm glacial origin of Sunnybrook Drift in the Lake Ontario Basin
(Mahaney, William C.) 2: 145
— Macrofabrics and quartz microstructures confirm glacial origin of the Sunnybrook Drift in the Lake Ontario Basin; discussion
(Gomez, Basil) 10: 1032
— Macrofabrics and quartz microstructures confirm glacial origin of the Sunnybrook Drift in the Lake Ontario Basin; reply
(Mahaney, William C.) 10: 1033
glaciolacustrine sedimentation: Thick and fast; sedimentation in a Pleistocene fiord lake of British Columbia, Canada
(Eyles, Nicholas, *et al.*) 11: 1153
lacustrine sedimentation: 2300 yr history of seismicity from silting events in Lake Tadoussac, Charlevoix, Quebec
(Doig, Ronald) 9: 820
sedimentation—provenance
clastic rocks: Sedimentological evidence for a limited separation between Armorica and Gondwana during the Early Ordovician
(Noblet, C., *et al.*) 4: 303
clasts: Pebbles from Barkerville and Slide Mountain terranes in a Quesnel Terrane conglomerate; evidence for pre-Jurassic deformation of the Barkerville and Slide Mountain terranes
(McMullin, David W. A., *et al.*) 10: 962
metaconglomerate: Sulfidization of Witwatersrand black sands; from enigma to myth
(Reimer, Thomas O., *et al.*) 5: 426
sandstone: Actualistic sandstone petrofacies; discriminating modern and ancient source rocks
(Ingersoll, Raymond V.) 8: 733
— Overlooked sedimentary particles from tropical weathering environments
(Johnsson, Mark J.) 2: 107
— $^{40}Ar/^{39}Ar$ laser-probe dating of detrital micas from the Montgomery Creek Formation, Northern California; clues to provenance, tectonics, and weathering processes
(Renne, Paul R., *et al.*) 6: 563
sedimentation—sedimentation rates
marine sedimentation: Accumulation of bank-top sediment on the western slope of Great Bahama Bank; rapid progradation of a carbonate megabank
(Wilber, R. Jude, *et al.*) 10: 970
— Response of Th/U in deep Labrador Sea sediments (ODP Site 646) to changes in sedimentation rates and paleoproductivities
(Hillaire-Marcel, C., *et al.*) 2: 162
sedimentation—transport
turbidity currents: Early Cretaceous shelf-edge deltas of the Baltimore Canyon Trough; principal sources for sediment gravity deposits of the northern Hatteras Basin
(Poag, C. Wylie, *et al.*) 2: 149
— Upslope flow of turbidity currents; a comparison among field observations, theory, and laboratory models
(Muck, Maureen T., *et al.*) 1: 54
wind transport: Development of the Gran Desierto sand sea, northwestern Mexico
(Blount, Grady, *et al.*) 8: 724
— Sand-drift surfaces; a neglected type of bounding surface
(Clemmensen, Lars B., *et al.*) 11: 1142
— Soil-forming intervals caused by eolian sediment pulses in the Lahontan Basin, northwestern Nevada
(Chadwick, Oliver A., *et al.*) 3: 243
— Stratigraphic evidence for late Quaternary dune activity near Hudson on the Piedmont of northern Colorado
(Forman, Steven L., *et al.*) 8: 745
sediments *see also* sedimentary rocks; sedimentary structures; sedimentation
sediments—carbonate sediments
diagenesis: New microtextural criterion for differentiation of compaction and early cementation in fine-grained limestones
(Lasemi, Zakaria, *et al.*) 4: 370
oolite: Spiny ooids; early subaerial deformation as opposed to late burial compaction
(Davaud, E., *et al.*) 9: 816
sediments—clastic sediments
alluvium: Channel trenching and climatic change in the Southern U.S. Great Plains; with Suppl. Data 90-09
(Hall, Stephen A.) 4: 342
colluvium: Late Holocene erosion and colluvium deposition in Swaziland
(Dardis, George F.) 10: 934
diamicton: Macrofabrics and quartz microstructures confirm glacial origin of Sunnybrook Drift in the Lake Ontario Basin
(Mahaney, William C.) 2: 145
— Macrofabrics and quartz microstructures confirm glacial origin of the Sunnybrook Drift in the Lake Ontario Basin; discussion
(Gomez, Basil) 10: 1032
— Macrofabrics and quartz microstructures confirm glacial origin of the Sunnybrook Drift in the Lake Ontario Basin; reply
(Mahaney, William C.) 10: 1033
loess: A 3 m.y. record of Pliocene-Pleistocene loess in interior Alaska
(Westgate, John A., *et al.*) 9: 858
— Paleoclimatic forcing of magnetic susceptibility variations in Alaskan loess during the late Quaternary
(Beget, James E., *et al.*) 1: 40
sand: Actualistic sandstone petrofacies; discriminating modern and ancient source rocks
(Ingersoll, Raymond V.) 8: 733

silt: 2300 yr history of seismicity from silting events in Lake Tadoussac, Charlevoix, Quebec
(Doig, Ronald) 9: 820
textures: Development of the Gran Desierto sand sea, northwestern Mexico
(Blount, Grady, *et al.*) 8: 724
till: Genetic till prism
(Hicock, Stephen R.) 6: 517
sediments—environmental analysis
arid environment: Stratigraphic evidence for late Quaternary dune activity near Hudson on the Piedmont of northern Colorado
(Forman, Steven L., *et al.*) 8: 745
sediments—geochemistry
iron: Fe(III)-reducing bacteria in deeply buried sediments of the Atlantic Coastal Plain
(Lovley, Derek R., *et al.*) 10: 954
trace elements: Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; discussion
(Kyte, Frank T.) 1: 87
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; discussion
(Bohor, Bruce F.) 1: 88
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; reply
(Schmitz, Birger) 1: 89
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; discussion
(Triplehorn, D. M.) 1: 92
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; reply
(Schmitz, Birger) 1: 93
sediments—lithofacies
lacustrine environment: Development of coarse-grained facies in lacustrine rift basins; examples from East Africa
(Scholz, Christopher A., *et al.*) 2: 140
sediments—marine sediments
detritus: Episodic rapid uplift in the Himalaya revealed by $^{40}Ar/^{39}Ar$ analysis of detrital K-feldspar and muscovite, Bengal Fan
(Copeland, Peter, *et al.*) 4: 354
diagenesis: Dolomite formation in anoxic sediments of Kau Bay, Indonesia
(Middelburg, Jack J., *et al.*) 5: 399
— On the mechanical role of smectite in subduction zones
(Vrolijk, Peter) 8: 703
— Response of Th/U in deep Labrador Sea sediments (ODP Site 646) to changes in sedimentation rates and paleoproductivities
(Hillaire-Marcel, C., *et al.*) 2: 162
environmental analysis: Early Cretaceous shelf-edge deltas of the Baltimore Canyon Trough; principal sources for sediment gravity deposits of the northern Hatteras Basin
(Poag, C. Wylie, *et al.*) 2: 149
— Stable-isotope record of organic carbon from an evolving carbonate banktop, Bight of Abaco, Bahamas
(Rasmussen, Kenneth A., *et al.*) 8: 790
lithofacies: Accumulation of bank-top sediment on the western slope of Great Bahama Bank; rapid progradation of a carbonate megabank
(Wilber, R. Jude, *et al.*) 10: 970
seismic methods *see under* geophysical methods
seismic surveys *see under* geophysical surveys *under* Africa; Atlantic Ocean; British Columbia; Maine; New Zealand; Northwest Territories; Norway; Ohio; Ontario; Pacific Ocean; Quebec; Sweden
seismology—seismicity
periodicity: 2300 yr history of seismicity from silting events in Lake Tadoussac, Charlevoix, Quebec
(Doig, Ronald) 9: 820
seismic zoning: Diapiric origin of the Blytheville and Pascola arches in the Reelfoot Rift, east-central United States; relation to New Madrid seismicity
(McKeown, F. A., *et al.*) 11: 1158
selenium—geochemistry
aqueous solutions: Selenium in aqueous solutions; the impossibility of obtaining a meaningful Eh using a platinum electrode, with implications for modeling of natural waters
(Runnells, Donald D., *et al.*) 3: 212
shale *see under* clastic rocks *under* sedimentary rocks
shatter cones *see under* shock metamorphism *under* metamorphism
shear zones *see under* effects *under* faults
sills *see under* intrusions
silt *see under* clastic sediments *under* sediments
Silurian *see also under* geochronology *under* New Brunswick
slope stability *see also* geomorphology
sodium—geochemistry
connate waters: Br-Cl-Na systematics in Illinois Basin fluids; constraints on fluid origin and evolution
(Walter, Lynn M., *et al.*) 4: 315
shale: Sodium-calcium ion exchange in the weathering of shales; implications for global weathering budgets; discussion
(Berner, Robert A., *et al.*) 2: 190
— Sodium-calcium ion exchange in the weathering of shales; implications for global weathering budgets; reply
(Cerling, Thure E., *et al.*) 2: 190
soil mechanics *see also* rock mechanics
soils—surveys
Colorado: Stratigraphic evidence for late Quaternary dune activity near Hudson on the Piedmont of northern Colorado
(Forman, Steven L., *et al.*) 8: 745
Nevada: Geomorphic assessment of late Quaternary volcanism in the Yucca Mountain area, southern Nevada; implications for the proposed high-level radioactive waste repository
(Wells, S. G., *et al.*) 6: 549
— Soil-forming intervals caused by eolian sediment pulses in the Lahontan Basin, northwestern Nevada
(Chadwick, Oliver A., *et al.*) 3: 243
Solomon Islands—economic geology
copper ores: Subduction, arc reversal, and the origin of porphyry copper-gold deposits in island arcs
(Solomon, M.) 7: 630
gold ores: Subduction, arc reversal, and the origin of porphyry copper-gold deposits in island arcs
(Solomon, M.) 7: 630
solution features *see under* geomorphology
South Africa—economic geology
gold ores: Sulfidization of Witwatersrand black sands; from enigma to myth
(Reimer, Thomas O., *et al.*) 5: 426
uranium ores: Sulfidization of Witwatersrand black sands; from enigma to myth
(Reimer, Thomas O., *et al.*) 5: 426
South Africa—geochronology
Archean: Direct dating of stromatolitic carbonates from the Schmidtsdrif Formation (Transvaal Dolomite), South Africa, with implications on the age of the Ventersdorp Supergroup
(Jahn, Bor-ming, *et al.*) 12: 1211
South America *see also* Andes; Argentina; Bolivia; Brazil; Peru; Venezuela
South America—geochemistry
isotopes: Oxygen isotope geochemistry of the silicic volcanic rocks of the Etendeka-Parana Province; source constraints
(Harris, Chris, *et al.*) 11: 1119
mantle: Mantle plumes and flood-basalt stratigraphy in the Parana, South America
(Peate, David W., *et al.*) 12: 1223
South Australia—geochemistry
trace elements: Acraman impact ejecta and host shales; evidence for low-temperature mobilization of iridium and other platinoids
(Wallace, Malcolm W., *et al.*) 2: 132

South Australia—tectonophysics
plate tectonics: Two-stage Early Cretaceous rifting of the Otway Basin margin of southeastern Australia; implications for rifting of the Australian southern margin
(Williamson, P. E., *et al.*) 1: 75

South Carolina—geochemistry
iron: Fe(III)-reducing bacteria in deeply buried sediments of the Atlantic Coastal Plain
(Lovley, Derek R., *et al.*) 10: 954

South Carolina—stratigraphy
Pliocene: High eustatic sea level during the middle Pliocene; evidence from the Southeastern U.S. Atlantic Coastal Plain; with Suppl. Data 90-13
(Dowsett, Harry J., *et al.*) 5: 435

South Dakota—petrology
metamorphism: Pressure-temperature-time path related to the thermotectonic evolution of an early Proterozoic metamorphic terrane, Black Hills, South Dakota
(Terry, Michael P., *et al.*) 8: 786

South-West Africa *see* Namibia

Southeastern U.S.—economic geology
phosphate deposits: Phosphogenesis and weathering of shelf sediments from the Southeastern United States; implications for Miocene $\delta^{13}C$ excursions and global cooling
(Compton, John S., *et al.*) 12: 1227

Southeastern U.S.—stratigraphy
changes of level: High eustatic sea level during the middle Pliocene; evidence from the Southeastern U.S. Atlantic Coastal Plain; with Suppl. Data 90-13
(Dowsett, Harry J., *et al.*) 5: 435
Miocene: Phosphogenesis and weathering of shelf sediments from the Southeastern United States; implications for Miocene $\delta^{13}C$ excursions and global cooling
(Compton, John S., *et al.*) 12: 1227

Southern Hemisphere *see also* Africa; Antarctica; Atlantic Ocean; Indian Ocean; Pacific Ocean; South America

Southern U.S. *see also* Alabama; Arkansas; Kentucky; Louisiana; Tennessee

Southwestern U.S. *see also* Arizona; New Mexico; Oklahoma; Texas

Southwestern U.S.—stratigraphy
Mesozoic: Speculative tectonic model for the early Mesozoic arc of the Southwest Cordilleran United States; discussion
(Marzolf, John E.) 3: 285
— Speculative tectonic model for the early Mesozoic arc of the Southwest Cordilleran United States; reply
(Busby-Spera, Cathy J.) 3: 285

Southwestern U.S.—structural geology
tectonics: Growth, stabilization, and reactivation of Proterozoic lithosphere in the Southwestern United States
(Bowring, Samuel A., *et al.*) 12: 1203
— Speculative tectonic model for the early Mesozoic arc of the Southwest Cordilleran United States; discussion
(Marzolf, John E.) 3: 285
— Speculative tectonic model for the early Mesozoic arc of the Southwest Cordilleran United States; reply
(Busby-Spera, Cathy J.) 3: 285

Southwestern U.S.—tectonophysics
crust: Growth, stabilization, and reactivation of Proterozoic lithosphere in the Southwestern United States
(Bowring, Samuel A., *et al.*) 12: 1203

Soviet Union *see* USSR

Spain—petrology
metamorphism: Archean protoliths within early Proterozoic granulitic crust of the West European Hercynian belt; possible relics of the West African Craton; discussion
(Kuijper, R. P.) 4: 382
— Archean protoliths within early Proterozoic granulitic crust of the West European Hercynian belt; possible relics of the West African craton; reply
(Guerrot, C., *et al.*) 4: 383

spectrometry *see* spectroscopy

spectroscopy *see also* chemical analysis

spectroscopy—laser methods
techniques: Intracrystalline carbon and oxygen isotope variations in calcite revealed by laser microsampling
(Dickson, J. A. D., *et al.*) 9: 809

Spitsbergen—geophysical surveys
remote sensing: Fast-flowing outlet glaciers on Svalbard ice caps
(Dowdeswell, Julian A., *et al.*) 8: 778

sponges—paleoecology
Eocene: Eocene deep-sea communities in localized limestones formed by subduction-related methane seeps, southwestern Washington
(Goedert, James L., *et al.*) 12: 1182

springs *see also* ground water

stratigraphy—classification
geons: Precambrian time units and nomenclature; the geon concept
(Hofmann, H. J.) 4: 340

stratigraphy—concepts
periodicity: Search for periodicity in global events in the geologic record; quo vadimus?
(Baksi, Ajoy K.) 10: 983

stratigraphy—nomenclature
tectonostratigraphic units: Opinion; Problems of terrane terminology; causes and effects
(Dover, James H.) 6: 487

strontium—geochemistry
dolomite: New distribution coefficient for the incorporation of strontium into dolomite and its implications for the formation of ancient dolomites
(Vahrenkamp, Volker C., *et al.*) 5: 387

strontium—isotopes
Sr-87/Sr-86: Abu Dhabi Sabkha, Persian Gulf, revisited; application of strontium isotopes to test an early dolomitization model
(Muller, Daniel W., *et al.*) 7: 618
— Channelized fluid flow through shear zones during fluid-enhanced dynamic recrystallization, Northern Apennines, Italy
(Carter, Karen E., *et al.*) 8: 720
— Geochronologic and isotopic evidence for involvement of pre-Pan-African crust in the Nubian Shield, Egypt
(Sultan, Mohamed, *et al.*) 8: 761
— Hydrothermal dolomitization of Jurassic-Cretaceous limestones in the Southern Alps (Italy); relation to tectonics and volcanism
(Cervato, Cinzia) 5: 458
— Intra-arc extension and magmatic evolution in the central Aleutian arc, Alaska
(Singer, Bradley S., *et al.*) 11: 1050
— Intraplate-type magmatism in a continent–island-arc collision zone; Porgera intrusive complex, Papua New Guinea
(Richards, Jeremy P., *et al.*) 10: 958
— Linear coupling of carbon and strontium isotopes in Rotliegend Sandstone, North Sea; evidence for cross-formational fluid flow
(Sullivan, Morgan D., *et al.*) 12: 1215
— Mahukona; the missing Hawaiian volcano
(Garcia, Michael O., *et al.*) 11: 1111
— Mantle sources in the Arizona transition zone and global mantle heterogeneity
(Cooper, Jeanne L., *et al.*) 11: 1146
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; discussion
(Kyte, Frank T.) 1: 87
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; reply
(Schmitz, Birger) 1: 89
— Rapid uplift and crustal growth in extensional environments; an isotopic study from the Death Valley region, California
(Asmerom, Yemane, *et al.*) 3: 223
— Shear zones in the upper mantle; relationship between geochemical enrichment and deformation in mantle peridotites
(Downes, H.) 4: 374

structural analysis *see also* folds; foliation; tectonics

structural analysis—folds
polyphase processes: Evolution of antivergent folds on a Paleozoic accretionary prism, Arkansas; an alternative view
(Babaei, Abdolali) 10: 987

structural analysis—interpretation
allochthons: Structure of the Appalachian deformation front in western Newfoundland; implications of multichannel seismic reflection data
(Stockmal, Glen S., *et al.*) 8: 765
polyphase processes: Implications of shear-sense criteria for the tectonic evolution of the central Rhodope Massif, southern Bulgaria
(Burg, Jean-Pierre, *et al.*) 5: 451
— Role of extensional tectonics in exhumation of eclogites and blueschists in an oblique subduction setting; northeastern Venezuela
(Ave Lallemant, Hans G., *et al.*) 10: 950
suture zones: Direction and shear sense during suturing of the Seven Devils-Wallowa Terrane against North America in western Idaho; discussion
(Lund, Karen, *et al.*) 10: 1031
— Direction and shear sense during suturing of the Seven Devils-Wallowa Terrane against North America in western Idaho; reply
(Strayer, Luther M., IV, *et al.*) 10: 1031
vents: New structural limits on magma chamber locations at the Valley of Ten Thousand Smokes, Katmai National Park, Alaska
(Wallmann, Peter C., *et al.*) 12: 1240

structural analysis—preferred orientation
calcite: Channelized fluid flow through shear zones during fluid-enhanced dynamic recrystallization, Northern Apennines, Italy
(Carter, Karen E., *et al.*) 8: 720
phyllites: Seismic anisotropy due to preferred mineral orientation observed in shallow crustal rocks in southern Alaska
(Brocher, Thomas M., *et al.*) 8: 737

structural geology—nomenclature
terranes: Opinion; Problems of terrane terminology; causes and effects
(Dover, James H.) 6: 487

structural petrology *see* structural analysis

Sudan—structural geology
tectonics: Orientation of late Precambrian sutures in the Arabian-Nubian shield
(Stern, Robert J., *et al.*) 11: 1103

sulfur—isotopes
S-34/S-32: Sulfur isotope evidence for regional recharge of saline water during continental glaciation, north-central United States
(Siegel, D. I.) 11: 1054
— Sulfur isotopic ratios of the magnetite-series and ilmenite-series granitoids of the Sierra Nevada Batholith; a reconnaissance study; discussion
(Zheng, Y. F.) 7: 671
— Sulfur isotopic ratios of the magnetite-series and ilmenite-series granitoids of the Sierra Nevada Batholith; a reconnaissance study; reply
(Ishihara, Shunso, *et al.*) 7: 672
— Timing of mississippi valley-type mineralization; relation to Appalachian orogenic events
(Kesler, Stephen E., *et al.*) 11: 1115

sulphur *see* sulfur

Swaziland—geochronology
Holocene: Late Holocene erosion and colluvium deposition in Swaziland
(Dardis, George F.) 10: 934

Sweden—geophysical surveys
seismic surveys: Deformation of the Baltic continental crust during Caledonide intracontinental subduction; views from seismic reflection data; discussion
(Hauser, Ernest C.) 6: 578
— Deformation of the Baltic continental crust during Caledonide intracontinental subduction; views from seismic reflection data; reply
(Hurich, C. A., *et al.*) 6: 579

Syria—tectonophysics
crust: Bouguer gravity trends and crustal structure of the Palmyride mountain belt and surrounding northern Arabian Platform in Syria
(Best, John A., *et al.*) 12: 1235

Taiwan—structural geology
neotectonics: Rapid Quaternary emergence, uplift, and denudation of the Coastal Range, eastern Taiwan
(Lundberg, Neil, *et al.*) 7: 638

Taiwan—tectonophysics
heat flow: Constraints on friction and stress in the Taiwan fold-and-thrust belt from heat flow and geochronology
(Barr, Terence D., *et al.*) 2: 111

Tanzania—volcanology
Oldoinyo Lengai: Physicochemical properties of alkali carbonatite lavas; data from the 1988 eruption of Oldoinyo Lengai, Tanzania
(Dawson, J. B., *et al.*) 3: 260

techniques *see under* laser methods *under* spectroscopy; *see under* absolute age

tectonics *see also* faults; folds; neotectonics; orogeny; plate tectonics; structural analysis; *see also under* structural geology *under* Africa; Alaska; Apennines; Appalachians; Arabian Peninsula; Arizona; Austria; Bolivia; British Columbia; Bulgaria; California; Canadian Shield; China; Corsica; Egypt; Great Basin; Great Lakes region; Idaho; Michigan; Montana; Namibia; Nevada; New Brunswick; Newfoundland; North America; Northwest Territories; Nova Scotia; Oklahoma; Ontario; Quebec; Saskatchewan; Southwestern U.S.; Sudan; Texas; Utah; Venezuela; Venus; Western Australia

tectonics—concepts
allochthons: Transpression, orogenic float, and lithospheric balance
(Oldow, John S., *et al.*) 10: 991
terranes: Opinion; Problems of terrane terminology; causes and effects
(Dover, James H.) 6: 487

temperature *see under* contact metamorphism *under* metamorphism; *see under* lava

Tennessee—stratigraphy
Paleozoic: Paleontological evidence of Paleozoic age for the Walden Creek Group, Ocoee Supergroup, Tennessee
(Unrug, Raphael, *et al.*) 11: 1041

tephrochronology *see under* geochronology

terrestrial crust *see* crust

terrestrial mantle *see* mantle

Tertiary *see also* Eocene; Paleogene; *see also under* stratigraphy *under* metamorphism

Tertiary—stratigraphy
boundary: Kara and Ust-Kara impact structures (USSR) and their relevance to the K/T boundary event
(Koeberl, Christian, *et al.*) 1: 50
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; discussion
(Kyte, Frank T.) 1: 87
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; discussion
(Bohor, Bruce F.) 1: 88
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; reply
(Schmitz, Birger) 1: 89
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; discussion
(Triplehorn, D. M.) 1: 92
— Origin of microlayering in worldwide distributed Ir-rich marine Cretaceous/Tertiary boundary clays; reply
(Schmitz, Birger) 1: 93

Tethys *see under* continental drift

Texas—geochronology
Holocene: Channel trenching and climatic change in the Southern U.S. Great Plains; with Suppl. Data 90-09
(Hall, Stephen A.) 4: 342

Texas—sedimentary petrology
diagenesis: Evidence for episodic basin dewatering in salt-dome cap rocks
(Hallager, W. S., *et al.*) 8: 716
Texas—soils
Paleosols: Paleosols and the Cretaceous/Tertiary transition in the Big Bend region of Texas
(Lehman, Thomas M.) 4: 362
Texas—stratigraphy
Cretaceous: Paleosols and the Cretaceous/Tertiary transition in the Big Bend region of Texas
(Lehman, Thomas M.) 4: 362
Paleocene: Paleosols and the Cretaceous/Tertiary transition in the Big Bend region of Texas
(Lehman, Thomas M.) 4: 362
Texas—structural geology
tectonics: Origin of arches in the northwestern Gulf of Mexico basin
(Laubach, Stephen E., *et al.*) 7: 595
theoretical studies *see under* clay mineralogy; deformation; diagenesis; fractures; oceanography; phase equilibria; sedimentary structures
thermal analysis *see also* chemical analysis; spectroscopy
thermoluminescence *see under* geochronology
thorium—isotopes
U-238/Th-232: Response of Th/U in deep Labrador Sea sediments (ODP Site 646) to changes in sedimentation rates and paleoproductivities
(Hillaire-Marcel, C., *et al.*) 2: 162
thrust faults *see under* displacements *under* faults
time scales *see under* geochronology
titanium—geochemistry
clinopyroxene: Discrimination of ophiolitic from nonophiolitic ultramafic-mafic allochthons in orogenic belts by the Al/Ti ratio in clinopyroxene
(Loucks, Robert R.) 4: 346
trace elements *see under* geochemistry *under* Andes; Antarctica; Arizona; Brazil; California; Colorado; diagenesis; Egypt; igneous rocks; lava; Moon; Pacific Ocean; sedimentary rocks; sediments; South Australia
tracks and trails *see* ichnofossils
tree rings *see under* geochronology
Triassic *see also under* geochronology *under* New Jersey; Pennsylvania; Wales; *see also under* stratigraphy *under* Alps
Trucial Coast *see* United Arab Emirates
tungsten ores—genesis
ore-forming fluids: Evaporites and strata-bound tungsten mineralization; discussion
(Trudu, Alfonso G.) 2: 188
— Evaporites and strata-bound tungsten mineralization; reply
(Ririe, G. Todd) 2: 189
Tunisia—sedimentary petrology
diagenesis: Spiny ooids; early subaerial deformation as opposed to late burial compaction
(Davaud, E., *et al.*) 9: 816
turbidity currents *see under* transport *under* sedimentation
Turkey—geochronology
Cambrian: Archean and Proterozoic ancestry in late Precambrian to early Paleozoic crustal elements of southern Turkey as revealed by single-zircon dating
(Kroner, A., *et al.*) 12: 1186
Precambrian: Archean and Proterozoic ancestry in late Precambrian to early Paleozoic crustal elements of southern Turkey as revealed by single-zircon dating
(Kroner, A., *et al.*) 12: 1186
underground water *see* ground water
United Arab Emirates—geochemistry
isotopes: Abu Dhabi Sabkha, Persian Gulf, revisited; application of strontium isotopes to test an early dolomitization model
(Muller, Daniel W., *et al.*) 7: 618
United Kingdom *see also* England; Great Britain; Scotland; Wales
United States *see also* Alabama; Alaska; Arizona; Arkansas; California; Colorado; Eastern U.S.; Georgia; Hawaii; Idaho; Illinois; Kansas; Kentucky; Louisiana; Maine; Maryland; Michigan; Midwest; Minnesota; Missouri; Montana; Nevada; New England; New Hampshire; New Jersey; New Mexico; New York; North Carolina; Ohio; Oklahoma; Oregon; Pacific Coast; Pennsylvania; South Carolina; South Dakota; Southwestern U.S.; Tennessee; Texas; Utah; Vermont; Virginia; Washington; West Virginia; Western U.S.; Wisconsin; Wyoming
uranium—geochemistry
bitumens: Pb-Pb dating of hydrocarbon migration into a bitumen-bearing ore deposit, North Wales
(Parnell, John, *et al.*) 10: 1028
uranium—isotopes
U-238/Th-232: Response of Th/U in deep Labrador Sea sediments (ODP Site 646) to changes in sedimentation rates and paleoproductivities
(Hillaire-Marcel, C., *et al.*) 2: 162
uranium ores *see also under* economic geology *under* New Mexico; South Africa
USSR—geochronology
Cretaceous: Kara and Ust-Kara impact structures (USSR) and their relevance to the K/T boundary event
(Koeberl, Christian, *et al.*) 1: 50
USSR—geomorphology
meteor craters: Kara and Ust-Kara impact structures (USSR) and their relevance to the K/T boundary event
(Koeberl, Christian, *et al.*) 1: 50
USSR—tectonophysics
crust: Proterozoic supercontinent, its latest Precambrian rifting, breakup, dispersal into small continents, and subsidence of their margins; evidence from Asia
(Ilyin, A. V.) 12: 1231
Utah—economic geology
gold ores: Mesozoic hydrothermal alteration associated with gold mineralization in the Mercur District, Utah
(Wilson, Paula N., *et al.*) 9: 866
Utah—geochronology
Cretaceous: Late Cretaceous extension in the hinterland of the Sevier thrust belt, northwestern Utah and southern Idaho; with Suppl. Data 90-20
(Wells, Michael L., *et al.*) 10: 929
Mesozoic: Mesozoic hydrothermal alteration associated with gold mineralization in the Mercur District, Utah
(Wilson, Paula N., *et al.*) 9: 866
Utah—petrology
metasomatism: Bleaching of limestones in the Notch Peak contact-metamorphic aureole, Utah
(Todd, Clifford S.) 1: 83
Utah—stratigraphy
Mississippian: Delle Phosphatic Member; an anomalous phosphatic interval in the Mississippian (Osagean-Meramecian) shelf sequence of central Utah
(Nichols, K. M., *et al.*) 1: 46
Utah—structural geology
tectonics: Late Cretaceous extension in the hinterland of the Sevier thrust belt, northwestern Utah and southern Idaho; with Suppl. Data 90-20
(Wells, Michael L., *et al.*) 10: 929
varves *see* lacustrine features *under* geomorphology
Venezuela—structural geology
tectonics: Role of extensional tectonics in exhumation of eclogites and blueschists in an oblique subduction setting; northeastern Venezuela
(Ave Lallemant, Hans G., *et al.*) 10: 950
Venus—structural geology
tectonics: Formation of mountain belts on Venus; evidence for large-scale convergence, underthrusting, and crustal imbrication in Freyja Montes, Ishtar Terra
(Head, James W.) 2: 99
Vermont—petrology
metamorphism: Use of reaction space in depicting polymetamorphic histories
(Schneiderman, Jill S.) 4: 350
Vertebrata *see also* ichnofossils; problematic fossils
vertebrates *see also* reptiles

vertebrates—biostratigraphy
Cretaceous: Paleontological view of the ages of the Deccan Traps, the Cretaceous/Tertiary boundary, and the India-Asia collision; discussion
(Thewissen, J. G. M.) 2: 185
— Paleontological view of the ages of the Deccan Traps, the Cretaceous/Tertiary boundary, and the India-Asia collision; discussion
(Buffetaut, Eric) 2: 186
— Paleontological view of the ages of the Deccan Traps, the Cretaceous/Tertiary boundary, and the India-Asia collision; reply
(Jaeger, J. J., *et al.*) 2: 186
— Paleosols and the Cretaceous/Tertiary transition in the Big Bend region of Texas
(Lehman, Thomas M.) 4: 362
Victoria—tectonophysics
plate tectonics: Two-stage Early Cretaceous rifting of the Otway Basin margin of southeastern Australia; implications for rifting of the Australian southern margin
(Williamson, P. E., *et al.*) 1: 75
Virginia—geomorphology
fluvial features: Fluvial response to debris associated with mass wasting during extreme floods
(Miller, Andrew J.) 7: 599
volcanic features *see under* geomorphology
volcanic rocks *see under* igneous rocks
volcanism *see under* volcanology
volcanoes *see under* volcanology
volcanology—volcanism
calderas: Nd- and Pb-isotope variations in the multicyclic central caldera cluster of the San Juan volcanic field, Colorado, and implications for crustal hybridization
(Riciputi, Lee R., *et al.*) 10: 975
island arcs: Intra-arc extension and magmatic evolution in the central Aleutian arc, Alaska
(Singer, Bradley S., *et al.*) 11: 1050
lava flows: Regional significance of recurrent faulting and intracanyon volcanism at Oak Creek canyon, southern Colorado Plateau, Arizona; with Suppl. Data 90-23
(Holm, Richard F., *et al.*) 10: 1014
mid-ocean ridges: Chemistry of seamounts near the East Pacific Rise; implications for the geometry of subaxial mantle flow
(Batiza, Rodey, *et al.*) 11: 1122
migration: Extension of the Yellowstone Plateau, eastern Snake River plain, and Owyhee Plateau; with Suppl. Data 90-28
(Rodgers, David W., *et al.*) 11: 1138
rift zones: Oceanic rift propagation; a cause of crustal underplating and seamount volcanism
(Calvert, A. J., *et al.*) 9: 886
submarine volcanoes: Mahukona; the missing Hawaiian volcano
(Garcia, Michael O., *et al.*) 11: 1111
volcanic fields: Geomorphic assessment of late Quaternary volcanism in the Yucca Mountain area, southern Nevada; implications for the proposed high-level radioactive waste repository
(Wells, S. G., *et al.*) 6: 549
volcanology—volcanoes
Mauna Loa: Implications of historical eruptive-vent migration on the northeast rift zone of Mauna Loa Volcano, Hawaii
(Lockwood, John P.) 7: 611
Mount Etna: Thermal radiance observations of an active lava flow during the June 1984 eruption of Mount Etna
(Pieri, David C., *et al.*) 10: 1018
Novarupta: New structural limits on magma chamber locations at the Valley of Ten Thousand Smokes, Katmai National Park, Alaska
(Wallmann, Peter C., *et al.*) 12: 1240
Oldoinyo Lengai: Physicochemical properties of alkali carbonatite lavas; data from the 1988 eruption of Oldoinyo Lengai, Tanzania
(Dawson, J. B., *et al.*) 3: 260
Wales—geochronology
Triassic: Pb-Pb dating of hydrocarbon migration into a bitumen-bearing ore deposit, North Wales
(Parnell, John, *et al.*) 10: 1028
Washington—geomorphology
landform evolution: Formation of Mima mounds; a seismic hypothesis
(Berg, Andrew W.) 3: 281
— Formation of Mima mounds; a seismic hypothesis; discussion
(Cox, G. W.) 12: 1259
— Formation of Mima mounds; a seismic hypothesis; reply
(Berg, Andrew W.) 12: 1260
Washington—petrology
intrusions: Discordant paleomagnetic poles from the Canadian Coast Plutonic Complex; regional tilt rather than large displacement?; discussion
(Miller, Robert B., *et al.*) 11: 1164
— Discordant paleomagnetic poles from the Canadian Coast Plutonic Complex; regional tilt rather than large displacement?; reply
(Butler, R. F., *et al.*) 11: 1165
— Middle Eocene dike swarms and their relation to contemporaneous plutonism, volcanism, core-complex mylonitization, and graben subsidence, Okanogan Highlands, Washington; with Suppl. Data 90-27
(Holder, Grace A. McCarley, *et al.*) 11: 1082
Washington—stratigraphy
Eocene: Eocene deep-sea communities in localized limestones formed by subduction-related methane seeps, southwestern Washington
(Goedert, James L., *et al.*) 12: 1182
Washington—structural geology
neotectonics: High-pressure metamorphism and uplift of the Olympic subduction complex
(Brandon, Mark T., *et al.*) 12: 1252
Washington—tectonophysics
plate tectonics: High-pressure metamorphism and uplift of the Olympic subduction complex
(Brandon, Mark T., *et al.*) 12: 1252
water *see also* ground water; hydrology
weathering—environment
tropical environment: Overlooked sedimentary particles from tropical weathering environments
(Johnsson, Mark J.) 2: 107
weathering—geochemistry
sodium: Sodium-calcium ion exchange in the weathering of shales; implications for global weathering budgets; discussion
(Berner, Robert A., *et al.*) 2: 190
— Sodium-calcium ion exchange in the weathering of shales; implications for global weathering budgets; reply
(Cerling, Thure E., *et al.*) 2: 190
weathering—interpretation
detritus: $^{40}Ar/^{39}Ar$ laser-probe dating of detrital micas from the Montgomery Creek Formation, Northern California; clues to provenance, tectonics, and weathering processes
(Renne, Paul R., *et al.*) 6: 563
West Germany—sedimentary petrology
sedimentary structures: Sand-drift surfaces; a neglected type of bounding surface
(Clemmensen, Lars B., *et al.*) 11: 1142
West Indies *see also* Bahamas; Barbados
West Virginia—geomorphology
fluvial features: Fluvial response to debris associated with mass wasting during extreme floods
(Miller, Andrew J.) 7: 599
Western Australia—stratigraphy
Devonian: Magnetostratigraphy, Late Devonian iridium anomaly, and impact hypotheses
(Hurley, Neil F., *et al.*) 4: 291
Western Australia—structural geology
tectonics: Precambrian tectonic evolution of part of Gondwana, southwestern Australia
(Myers, John S.) 6: 537

Western Australia—tectonophysics
crust: Precambrian tectonic evolution of part of Gondwana, southwestern Australia
(Myers, John S.) 6: 537
Western Hemisphere *see also* Atlantic Ocean; North America; Pacific Ocean; South America
Western U.S. *see also* Alaska; California; Colorado; Hawaii; Idaho; Montana; Nevada; Oregon; Pacific Coast; Utah; Washington; Wyoming
Western U.S.—tectonophysics
crust: U.S. west coast revisited; an aeromagnetic perspective
(Johnson, Peter R., *et al.*) 4: 332
Wisconsin—hydrogeology
ground water: Sulfur isotope evidence for regional recharge of saline water during continental glaciation, north-central United States
(Siegel, D. I.) 11: 1054
worms—paleoecology
Eocene: Eocene deep-sea communities in localized limestones formed by subduction-related methane seeps, southwestern Washington
(Goedert, James L., *et al.*) 12: 1182
Wyoming—stratigraphy
Paleogene: Early Oligocene paleovalleys in southern and central Wyoming; evidence of high local relief on the late Eocene unconformity
(Evanoff, Emmett) 5: 443
Wyoming—structural geology
deformation: Bent chert tubes in the Phosphoria Formation of Wyoming; pressure solution strain markers
(Scotford, David M., *et al.*) 9: 846
Wyoming—tectonophysics
crust: Extension of the Yellowstone Plateau, eastern Snake River plain, and Owyhee Plateau; with Suppl. Data 90-28
(Rodgers, David W., *et al.*) 11: 1138
X-ray analysis *see also* chemical analysis; spectroscopy
xenoliths *see under* inclusions
Yukon Territory—geochronology
absolute age: Ancient continental margin assemblage in the northern Coast Mountains, Southeast Alaska and Northwest Canada
(Gehrels, George E., *et al.*) 3: 208
zoogeography *see* biogeography

Geology Author Index
Volume 18

Abbinett, D. 8: 773
Abbott, Dallas 1: 58
Abercrombie, Hugh 6: 541
Abrams, Michael J. 10: 1018
Abuzied, Hassan 8: 761
Acharyya, S. K. 5: 439
Ager, Thomas A. 4: 311
Aitken, J. D. 12: 1199
Aksu, A. 2: 162
Al-Saad, Damen 12: 1235
Alabaster, T. 6: 497
Albertini, Marie-Anne 4: 381
Allen, M. B. 2: 128
Allmendinger, Richard W. 10: 929
Altaner, Stephen P. 3: 247
Alvarez, Walter 5: 407
Anders, Mark H. 9: 914
Anderson, Robert S. 6: 524
Anderson, Suzanne Prestrud 6: 524
Andrieux, Jean 4: 381
Anovitz, L. M. 5: 466
Armstrong, Richard A. 11: 1119
Arthur, M. A. 3: 227
Arvidson, Raymond E. 8: 761
Arvidson, Raymond E. 11: 1103
Asmerom, Yemane 3: 223
Austin, James A., Jr. 10: 1023
Ave Lallemant, Hans G. 10: 950
Ave Lallemant, Hans G. 10: 991
Baars, D. L. 8: 687
Babaei, Abdolali 10: 987
Bain, Roger J. 5: 447
Baksi, Ajoy K. 10: 983
Ball, Mahlon M. 1: 95
Ball, Mahlon M. 2: 149
Ballevre, M. 8: 741
Bally, Albert W. 10: 991
Barazangi, Muawia 12: 1235
Barker, Charles E. 10: 1003
Barr, Sandra M. 7: 670
Barr, Terence D. 2: 111
Barreiro, Barbara 7: 626
Barrett, Timothy J. 7: 583
Barrow, Eric J. 6: 489
Bartley, John M. 6: 554
Batiza, Rodey 11: 1122
Bayer, R. 7: 587
Beaufort, Daniel 11: 1126
Becker, Tim A. 6: 563
Beekman, F. 7: 603
Beget, James E. 1: 40
Behrmann, J. H. 7: 673
Bell, John W. 7: 622
Bellion, Yves 6: 571
Benjamin, Anne E. 7: 642
Berg, Andrew W. 3: 281
Berg, Andrew W. 12: 1260
Berner, Elizabeth K. 2: 190
Berner, Robert A. 2: 190
Bertrand-Sarfati, J. 12: 1211
Best, Eric 11: 1103
Best, John A. 12: 1235
Bevier, Mary Lou 5: 411
Bickford, M. E. 1: 3
Bickford, M. E. 1: 14
Blewett, R. S. 12: 1257
Blisniuk, P. M. 4: 299
Blome, Charles D. 7: 665
Bloomer, S. 5: 470
Blount, Grady 8: 724
Boardman, Mark R. 4: 370
Bohor, Bruce F. 1: 88
Bois, C. 7: 587
Bond, Kevin R. 4: 332
Bonham, Harold F., Jr. 2: 157
Bonhomme, Michel G. 10: 946
Bonilla, Manuel G. 2: 153
Bosence, Dan 1: 26
Bouchez, Jean Luc 10: 966
Bourcier, William L. 8: 769
Bowring, Samuel A. 8: 761
Bowring, Samuel A. 12: 1203
Box, Stephen E. 12: 1219
Bradshaw, John Y. 12: 1219
Brandner, R. 9: 828
Brandon, Mark T. 3: 276
Brandon, Mark T. 12: 1252
Brandt, Danita S. 9: 911
Brantley, Susan L. 2: 136
Brasier, M. D. 2: 175
Broadhead, Thomas W. 9: 850
Brocher, Thomas M. 8: 737
Brooks, James 4: 311
Buchholtz-ten Brink, Marilyn R. 3: 268
Buffetaut, Eric 2: 186
Buhl, Peter 5: 462
Burdett, J. W. 3: 227
Burg, Jean-Pierre 5: 451
Burke, Kevin 1: 50
Busby-Spera, Cathy J. 3: 255
Busby-Spera, Cathy J. 3: 285
Butler, R. F. 8: 801
Butler, R. F. 11: 1165
Calderwood, Arthur R. 12: 1252
Calvert, A. J. 9: 886
Calvert, A. J. 11: 1091
Canil, Dante 10: 1011
Cannat, Mathilde 4: 319
Capdevila, R. 4: 383
Carbotte, Suzanne M. 8: 749
Carey, William P. 7: 658
Carlson, Diane H. 11: 1082
Carter, Karen E. 8: 720
Casanova, Joel 3: 264
Causse, C. 2: 162
Cazes, M. 7: 587
Cecil, C. Blaine 6: 533
Cerling, Thure E. 2: 190
Cervato, Cinzia 5: 458
Chadwick, Oliver A. 3: 243
Chamberlain, C. Page 4: 307
Chamberlain, C. Page 7: 626
Chamberlain, Kevin R. 8: 761
Channell, J. E. T. 9: 828
Chapelle, Francis H. 10: 954
Chappell, Bruce W. 10: 958
Charles Darwin Scientific Party 5: 470
Chase, C. G. 5: 466
Chiarenzelli, Jeffrey R. 1: 14
Chitwood, John P. 7: 634
Christensen, Nikolas I. 8: 737
Christiansen, P. P. 9: 832
Church, W. R. 12: 1258
Clark, Elizabeth A. 7: 662
Clemmensen, Lars B. 11: 1142
Clendenin, C. W. 1: 67
Clendenin, C. W. 2: 116
Cloetingh, S. A. 7: 603
Cloud, Robert A. 10: 1014
Clowes, R. M. 11: 1091
Clowes, Ron M. 9: 886
Cole, James C. 1: 35
Cole, James C. 12: 1259
Coleman, Drew S. 6: 554
Collerson, K. D. 1: 14
Collin, R. Lindsay 8: 778
Collins, Lorence G. 11: 1163
Compton, John S. 12: 1227
Cook, Frederick A. 6: 513
Cook, Frederick A. 7: 662
Cooper, Jeanne L. 11: 1146
Copeland, Peter 4: 354
Corfield, R. M. 2: 175
Corrigan, Jeff 6: 558
Corriveau, Louise 7: 614
Coulon, Michel 4: 381
Cowan, Darrel S. 3: 276
Cox, G. W. 12: 1259
Crerar, David A. 2: 136
Cronin, Thomas M. 5: 435
Crowe, B. M. 6: 549
Cullicott, C. E. 9: 832
Culotta, Raymond C. 7: 646
Currie, K. L. 12: 1257
Dahlen, F. A. 2: 111
Dal Piaz, G. V. 7: 587
Dallmeyer, R. David 10: 929
Damanti, John F. 9: 835
Damotte, B. 7: 587
Daniels, Eric J. 3: 247
Dardis, George F. 10: 934
Davaud, E. 9: 816
Davey, F. J. 10: 979
Davidson, G. F. 10: 1031
Davis, D. W. 6: 505
Davis, Jonathan O. 3: 243
Dawson, J. B. 3: 260
de Lange, Gert J. 5: 399
de Smeth, J. B. 5: 439
de Vernal, A. 2: 162
Deffeyes, K. S. 9: 832
Denlinger, R. P. 6: 493
Detrick, Robert S. 5: 462
Dewers, Thomas 3: 204
Dickinson, W. R. 11: 1165
Dickson, J. A. D. 9: 809
Diehl, S. F. 11: 1158
Dimor, Dimo 5: 451
Diot, Herve 10: 966
Doblas, Miguel 4: 381
Doig, Ronald 9: 820
Doig, Ronald 11: 1078
Donelick, Raymond Allen 2: 103
Dorsey, Rebecca Jones 7: 638
Dosso, L. 4: 383
Doutsos, Theodor 12: 1256
Dover, James H. 6: 487
Dowdeswell, Julian A. 8: 778
Downes, H. 4: 374
Dowsett, Harry J. 5: 435
Driese, Steven G. 9: 850
Duane, M. J. 2: 116
Dubois, Roger N. 11: 1150
Dubois, Roland 10: 1007
Dunning, G. R. 8: 795
Dworkin, Stephen I. 8: 720
Dyrelius, D. 6: 579
Eckert, James O., Jr. 4: 379
ECORS-CROP Working Group 7: 587
Eggleston, Jane R. 3: 247
Eichelberger, John C. 12: 1240
Eide, Elizabeth A. 7: 642
Eisbacher, G. H. 4: 299
El Kaliouby, Baher 8: 761
Elias, Robert J. 9: 911
Elmore, R. Douglas 2: 124
Elmore, R. Douglas 9: 906
Emerman, Steven H. 3: 231
Emery, D. 12: 1178
England, Philip 12: 1173
Erez, Jonathan 12: 1191
Eriksson, Kenneth A. 5: 474

Ernewein, M. 5: 470
Essene, E. J. 9: 839
Evanoff, Emmett 5: 443
Evans, Brian 2: 136
Eyal, Moshe 6: 545
Eyal, Yehuda 6: 545
Eyles, Nicholas 11: 1153
Fallick, Anthony E. 12: 1215
Falloon, Trevor J. 3: 195
Falvey, D. A. 1: 75
Farmer, G. L. 1: 5
Feng, Rui 9: 870
Feraud, G. 8: 741
Ferris, F. G. 10: 995
Filson, Tammy 7: 642
Finger, F. 12: 1207
Fisk, M. R. 6: 493
Fiske, P. S. 9: 832
Flack, Catherine A. 6: 528
Flemings, Peter B. 5: 430
Follmi, Karl B. 11: 1069
Fontes, Jean-Charles 6: 501
Forman, Steven L. 8: 745
Forsstrom, Lars 8: 804
Forsyth, D. A. 8: 773
Foucher, Jean Paul 9: 854
Fouillac, Anne Marie 11: 1126
Fournier, Marc 10: 1007
Friberg, La Verne M. 8: 786
Frisch, W. 7: 673
Frisch, W. 7: 675
Frizon de Lamotte, Dominique 4: 381
Frydas, D. 12: 1256
Fulp, Michael S. 2: 179
Galbreath, Kevin C. 4: 295
Gans, Phillip B. 6: 577
Garcia, Michael O. 11: 1111
Gariepy, Clement 11: 1078
Gebran, Ali 12: 1235
Gehrels, G. E. 11: 1165
Gehrels, George E. 3: 208
Gehrels, George E. 8: 801
Geis, Wayne T. 6: 513
Geissman, John W. 1: 79
Geissman, John W. 9: 914
Genovese, Paul W. 11: 1107
Gerlach, David C. 3: 268
Ghaleb, B. 2: 162
Ghent, Edward D. 2: 103
Gilbert, Robert 12: 1169
Glaze, Lori S. 10: 1018
Glick, E. E. 11: 1158
Goedert, James L. 12: 1182
Goffe, Bruno 10: 1007
Goldstein, Robert H. 10: 1003
Gomez, Basil 10: 1032
Gose, W. A. 8: 716
Gosso, G. 7: 587
Gostin, Victor A. 2: 132
Goydas, Michael J. 7: 634
Green, A. G. 11: 1086
Green, Alan G. 6: 513
Green, David H. 3: 195
Greenwood, Hugh J. 10: 962
Grieve, R. A. F. 8: 773
Grimm, Kurt A. 11: 1069
Groszos, Mark S. 11: 1046
Grotzinger, John P. 3: 227
Guellec, S. 7: 587
Guerrot, C. 4: 383
Guezou, Jean-Claude 4: 381
Guth, Lawrence R. 10: 950
Hackett, William R. 11: 1138
Haddad, Robert I. 8: 790
Hall, David J. 9: 862
Hall, M. A. 2: 175
Hall, Stephen A. 4: 342
Hallager, W. S. 8: 716
Halley, Robert B. 10: 970
Hamilton, R. M. 11: 1158
Handford, C. Robertson 8: 691
Hanks, Catherine L. 5: 395
Hansen, Vicki L. 4: 365
Hargraves, R. B. 9: 832
Harris, Chris 11: 1119
Harris, N. B. W. 5: 478
Harris, Nicholas B. 3: 288
Harris, Nicholas B. 8: 799
Harrison, T. Mark 2: 184
Harrison, T. Mark 4: 354
Hart, William K. 11: 1146
Harvey, James L. 9: 850
Hasselgren, E. A. 9: 886
Haszeldine, R. Stuart 12: 1215
Hatcher, Robert D., Jr. 8: 708
Haugerud, Ralph A. 2: 183
Hauser, Ernest 4: 378
Hauser, Ernest C. 6: 578
Hawkesworth, Chris J. 12: 1223
Hawkins, Daniel B. 1: 40
Head, James W. 2: 99
Heizler, Matthew T. 2: 184
Helu, S. 5: 470
Helz, R. T. 11: 1065
Henderson, J. R. 7: 654
Henderson, M. N. 7: 654
Henry, G. 1: 67
Henry, Pierre 9: 854
Herail, Gerard 10: 946
Hibbard, J. P. 2: 170
Hickman, Stephen H. 2: 136
Hicock, Stephen R. 6: 517
Hildreth, Wes 12: 1240
Hill, Mason L. 1: 23
Hillaire-Marcel, C. 2: 162
Hillaire-Marcel, Claude 3: 264
Hine, Albert C. 1: 95
Hine, Albert C. 11: 1153
Hirn, A. 7: 587
Hodell, David A. 12: 1227
Hodkinson, R. A. 5: 470
Hodych, J. P. 8: 795
Hofmann, H. J. 4: 340
Hofmann, H. J. 12: 1199
Holder, Grace A. McCarley 11: 1082
Holder, R. Wade 11: 1082
Holm, Daniel K. 2: 166
Holm, Daniel K. 3: 223
Holm, Daniel K. 6: 520
Holm, Richard F. 10: 1014
Hooper, Robert J. 8: 708
Hopson, R. Forrest 4: 336
Hopson, R. Forrest 11: 1163
Hotton, Carol L. 9: 874
Hougen, S. 9: 832
Howard, Katherine J. 6: 493
Howell, Paul D. 12: 1195
Hsu, Kenneth J. 5: 478
Huang, Qing 1: 79
Hubert, C. 11: 1086
Huggett, Q. J. 5: 470
Hupp, Cliff R. 7: 658
Hurich, C. A. 6: 579
Hurley, Neil F. 4: 291
Husch, Jonathan M. 8: 699
Huston, Ted J. 4: 315
Hutcheon, Ian 6: 541
Hyndman, D. W. 10: 1031
Hynes, Andrew 4: 323
Hynes, Andrew J. 5: 403
Ilyin, A. V. 12: 1231
Ingersoll, Raymond V. 8: 733
Ishihara, Shunso 7: 672
Ivanov, Zivko 5: 451
Jackson, Jay L. 3: 208
Jackson, Mary L. W. 7: 595
Jackson, S. L. 11: 1086
Jacobsen, Stein B. 3: 223
Jaeger, J. J. 2: 186
Jahn, Bor-ming 12: 1211
Jarvis, Ian 7: 583
Jarvis, Kym E. 7: 583
Jedoui, Y. 9: 816
Johnson, Clark M. 10: 975
Johnson, David A. 7: 642
Johnson, J. G. 1: 44
Johnson, J. G. 9: 918
Johnson, L. 5: 470
Johnson, M. R. W. 8: 753
Johnson, Peter R. 4: 332
Johnson, Rex J. E. 9: 898
Johnson, Samuel Y. 11: 1164
Johnsson, Mark J. 2: 107
Jolivet, Laurent 10: 1007
Jones, David L. 3: 268
Jordan, Teresa E. 5: 430
Jourdan, Claudie 10: 1007
Kalaghan, Theresa 4: 380
Kanagy, Sherman P., II 4: 358
Karig, D. E. 2: 170
Karlstrom, Karl E. 12: 1203
Katzer, Terry 7: 622
Keating, Gordon N. 7: 642
Keays, Reid R. 2: 132
Kehew, Alan E. 5: 479
Keppie, J. D. 7: 669
Kerrich, Robert 3: 238
Kerrich, Robert 9: 870
Kerrich, Robert 9: 882
Kesler, Stephen E. 11: 1115
King, David T., Jr. 1: 19
King, David T., Jr. 7: 591
Kish, Stephen A. 7: 650
Klain, Laslo 5: 451
Klein, George DeVries 5: 455
Klemperer, Simon L. 6: 528
Klepacki, D. 8: 801
Klepacki, D. 11: 1165
Klitgord, K. D. 6: 493
Knapp, Ralph W. 3: 251
Knecht, Matthew D. 9: 846
Knipe, Robert J. 9: 824
Koeberl, Christian 1: 50
Kontak, Daniel J. 3: 238
Kontopoulos, Nikolaos 12: 1256
Koons, P. O. 8: 679
Kreulen, Rob 5: 399
Kristoffersen, Y. 6: 579
Krogh, T. E. 6: 505
Krois, Peter 11: 1095
Kroner, A. 12: 1186
Kroner, Alfred 11: 1103
Kroner, A. 6: 545
Kuijper, R. P. 4: 382
Kurz, Mark D. 11: 1111
Kyle, J. R. 8: 716
Kyte, Frank T. 1: 87
Lacassin, R. 7: 587
Lacazette, Alfred 8: 782
Lagabrielle, Yves 4: 319
Lagabrielle, Yves 8: 741
Lallemant, Siegfried J. C. 9: 854
Lancaster, Nicholas 8: 724
Langston, R. B. 11: 1065
Langton, John P. 11: 1073
Lanza, R. 7: 587
Lasemi, Zakaria 4: 370
Latin, Dave 4: 327
Laubach, Stephen E. 7: 595
Lazar, Boaz 12: 1191
Le Pichon, Xavier 9: 854
Leach, Mark C. 2: 124
Lefort, J. P. 4: 303
Lehman, Thomas M. 4: 362
Lewry, J. F. 1: 14
Lezine, Anne-Marie 3: 264
Li, Yianping 1: 79

Lienkaemper, J. J. 2: 153
Lindberg, Ralph D. 3: 212
Lister, Gordon S. 3: 216
Locke, William W. 9: 918
Lockwood, John P. 7: 611
Loeffler, Bruce M. 7: 642
Lofgren, Donald L. 9: 874
Lord, Mark L. 5: 479
Loucks, Robert R. 4: 346
Lovley, Derek R. 10: 954
Ludden, J. N. 11: 1086
Luetgert, James H. 9: 878
Lund, Karen 10: 1031
Lundberg, Neil 7: 638
Lux, Daniel R. 3: 223
Lyons, Timothy W. 2: 190
Maat, Paula 8: 745
Macdonald, Ken C. 8: 749
Mace, J. 12: 1211
Magloughlin, Jerry F. 8: 800
Magwood, James P. A. 8: 729
Mahaney, William C. 2: 145
Mahaney, William C. 10: 1033
Maiden, K. J. 1: 67
Makris, Janis 10: 1023
Mann, C. John 4: 358
Mann, Carol E. 9: 878
Mann, Paul 6: 558
Mantovani, Marta S. M. 12: 1223
Marin, Luis 8: 803
Marrett, Randall 3: 231
Marshak, Stephen 3: 247
Marshall, J. D. 1: 31
Martel, Stephen J. 12: 1248
Marthelot, J. M. 7: 587
Martin, Mark W. 6: 554
Marzolf, John E. 3: 285
Matray, Jean-Michel 6: 501
Matthews, R. K. 10: 942
May, S. R. 8: 801
May, S. R. 11: 1165
Mayrand, L. 11: 1086
McCaig, Andrew M. 9: 824
McCartan, Lucy 4: 311
McClain, J. S. 6: 493
McClelland, W. C. 8: 801
McClelland, W. C. 11: 1165
McClelland, William C. 3: 208
McConnell, David A. 7: 634
McCulloch, Malcolm T. 10: 958
McDougall, James W. 11: 1164
McFadden, L. D. 6: 549
McGeary, Susan E. 6: 528
McGroder, Michael F. 3: 276
McKee, Edwin H. 12: 1248
McKenzie, Judith A. 7: 618
McKeown, F. A. 11: 1158
McLean, Roger 1: 62
McMullin, David W. A. 10: 962
McMurray, Gregory R. 6: 493
McNeil, David H. 5: 415
McSween, Harry Y., Jr. 10: 938
Meldahl, Keith H. 9: 890
Menke, William 1: 58
Mertzman, Stanley A. 7: 642
Michard, Andre 10: 1007
Middelburg, Jack J. 5: 399
Milkereit, Bernd 6: 513
Milkereit, Bernd 11: 1086
Miller, Andrew J. 7: 599
Miller, Elizabeth L. 6: 577
Miller, Elizabeth L. 8: 712
Miller, Kenneth G. 5: 415
Miller, Robert B. 11: 1164
Miller, S. 5: 470
Milliman, John D. 10: 970
Milner, Simon C. 11: 1119
Minshull, Timothy A. 5: 462
Miyata, Takao 5: 392
Mochel, David W. 7: 642
Moll-Stalcup, Elizabeth J. 12: 1219
Molnar, Peter 12: 1173
Morin, N. 12: 1211
Morris, Ellen 5: 462
Mossman, David J. 5: 426
Muck, Maureen T. 1: 54
Mueller, Paul A. 7: 618
Muenow, David W. 11: 1111
Mugnier, J. L. 7: 587
Muller, Daniel W. 7: 618
Mullins, Henry T. 1: 95
Mullins, Henry T. 11: 1153
Murali, A. V. 1: 50
Murphy, J. Brendan 5: 403
Murray, Richard W. 3: 268
Murton, B. J. 5: 470
Mutter, John C. 5: 462
Myers, James D. 11: 1050
Myers, John S. 6: 537
Myers, K. J. 12: 1178
Myers, P. E. 10: 1031
Narbonne, G. M. 12: 1199
Nelson, K. Douglas 4: 378
Nelson, Robert B. 6: 576
Nelson, W. John 4: 378
Neubauer, F. 7: 673
Neubauer, F. 7: 675
Neumann, A. Conrad 8: 790
Nichols, K. M. 1: 46
Nicolas, A. 7: 587
Nicolich, R. 7: 587
Nielsen, Kent C. 11: 1103
Nisbet, E. G. 1: 4
Nitchman, Steven P. 5: 422
Niu, Yaoling 11: 1122
Noblet, C. 4: 303
Noblett, Jeffrey B. 2: 120
Norton, G. E. 3: 260
Nur, Amos 1: 79
O'Brien, G. W. 1: 75
Oczlon, Martin S. 6: 509
Oh, Jinyong 10: 1023
Oldow, John S. 10: 991
Oliver, G. J. H. 8: 753
Oliver, J. 7: 646
Oller, Jaime 10: 946
Olsen, Paul E. 8: 695
O'Neill, J. Michael 11: 1107
Ore, H. Thomas 11: 1138
Ori, Gian Gabriele 12: 1256
Ortoleva, Peter 3: 204
Oyarzun, Roberto 4: 381
Pallister, John S. 1: 35
Pallister, John S. 12: 1259
Palm, H. 6: 579
Panno, Samuel V. 8: 769
Papike, J. J. 4: 295
Paquette, Jeanne 12: 1244
Parnell, John 10: 1028
Parrish, R. R. 2: 103
Parry, W. T. 9: 866
Parson, L. M. 5: 470
Patchett, P. Jonathan 3: 208
Patrier, Patricia 11: 1126
Pearce, J. A. 5: 470
Peate, David W. 12: 1223
Pederson, B. L. 2: 190
Pemberton, S. George 8: 729
Percival, John A. 6: 513
Perry, Eugene 8: 803
Pessagno, Emile A., Jr. 7: 665
Peucat, J. J. 4: 383
Pewe, Troy L. 9: 858
Phillips, Andrew C. 1: 10
Phillips, Elizabeth J. P. 10: 954
Phillips, Joseph D. 10: 1023
Piasecki, M. A. J. 12: 1257
Pickering, K. T. 12: 1257
Pieri, David C. 10: 1018
Pilkington, M. 8: 773
Pinkerton, H. 3: 260
Piper, David J. W. 12: 1256
Pirrie, D. 1: 31
Poag, C. Wylie 2: 149
Poisson, Andre 4: 381
Polach, Henry 1: 62
Polino, R. 7: 587
Pollard, David D. 12: 1240
Poole, Andrew J. 9: 894
Poulimenos, G. 12: 1256
Powell, Ross D. 1: 10
Pratt, T. 7: 646
Pratt, Thomas 4: 378
Premo, W. R. 11: 1065
Price, P. E. 8: 716
Purdy, G. Michael 10: 1023
Purtscheller, Fridolin 11: 1095
Pyle, D. M. 3: 260
Quick, James E. 1: 35
Quick, Thomas J. 3: 220
Quinn, Terrence M. 10: 942
Raeside, Robert P. 7: 670
Rage, J. C. 2: 186
Raheim, A. 9: 809
Railsback, L. Bruce 9: 917
Ramseyer, Karl 4: 336
Ramseyer, Karl 11: 1163
Rasmussen, Kenneth A. 8: 790
Ratschbacher, L. 7: 673
Ratschbacher, L. 7: 675
Ravat, J. 7: 587
Ravenhurst, Casey E. 11: 1073
Ray, K. K. 5: 439
Reeder, Richard J. 12: 1244
Reeve, Andrew 8: 803
Reimer, Thomas O. 5: 426
Reiter, Ed 10: 1023
Renault, C. E. 6: 549
Renne, Paul R. 6: 563
Reston, T. J. 3: 272
Reynolds, Stephen J. 3: 216
Richards, Jeremy P. 10: 958
Riciputi, Lee R. 10: 975
Ricketts, B. D. 7: 603
Ricou, Luc-Emmanuel 5: 451
Ririe, G. Todd 2: 189
Ritz, Michel 6: 571
Robertson, Alastair H. F. 9: 894
Robinson, Jennifer M. 7: 607
Robinson, Mark S. 9: 902
Rodda, Peter 5: 470
Roddick, J. Chris 11: 1073
Rodgers, David W. 11: 1138
Ron, Hagai 1: 79
Rona, Peter A. 6: 493
Root, Kevin G. 5: 419
Rosendahl, Bruce R. 2: 140
Ross, John V. 10: 962
Rothwarf, Miriam T. 7: 642
Roure, F. 7: 587
Rubin, Charles M. 3: 276
Ruffet, G. 8: 741
Rumble, Douglas, III 7: 626
Runkel, Anthony C. 9: 874
Runnells, Donald D. 3: 212
Russ, G. Price, III 3: 268
Sacks, Paul E. 10: 999
Saleeby, Jason B. 3: 255
Saleeby, Jason B. 3: 276
Samson, Scott D. 3: 208
Sanborn, Robert 8: 803
Sandberg, Philip A. 4: 370
Sanford, Richard F. 11: 1099
Sasaki, Akira 7: 672
Sassani, David C. 10: 925
Saunders, James A. 8: 757
Sawaf, Tarif 12: 1235

Sawkins, Frederick J. 11: 1061
Sawyer, Dale S. 10: 1023
Scaillet, S. 8: 741
Scarascia, S. 7: 587
Schandl, Eva Susan 6: 505
Schermer, Elizabeth R. 11: 1130
Schlee, John S. 2: 149
Schlische, Roy W. 8: 695
Schmid, S. M. 7: 673
Schmid, S. M. 7: 675
Schmidt, Christopher J. 11: 1107
Schmitt, James G. 6: 567
Schmitz, Birger 1: 89
Schmitz, Birger 1: 93
Schneiderman, Jill S. 4: 350
Scholz, Christopher A. 2: 140
Schroeder, Paul A. 2: 190
Scotchman, I. C. 8: 799
Scotford, David M. 9: 846
Scott, Deborah L. 2: 140
Sears, J. W. 10: 1031
Secor, Donald T., Jr. 10: 999
Segall, Paul 12: 1248
Selverstone, Jane 2: 166
Selverstone, Jane 4: 307
Sempere, Thierry 10: 946
Sengor, A. M. C. 6: 575
Sengor, A. M. C. 12: 1186
Sengupta, S. 5: 439
Sevigny, J. H. 2: 103
Shanmugam, G. 3: 287
Sharpton, Virgil L. 1: 50
Shaw, John 5: 480
Shaw, John 8: 804
Shaw, John 12: 1169
Shearer, C. K. 4: 295
Sheetz, Linda L. 2: 149
Sheffels, Barbara Moths 9: 812
Shimmield, Graham B. 9: 894
Shock, Everett L. 10: 925
Shukowsky, Wladimir 12: 1223
Siegel, D. I. 11: 1054
Silberling, N. J. 1: 46
Sillitoe, Richard H. 2: 157
Simpson, Carol 4: 380
Simpson, Edward L. 5: 474
Singer, Bradley S. 11: 1050
Sirkin, Leslie A. 4: 311
Sleep, Norman H. 9: 914
Sloan, L. Cirbus 6: 489
Smalley, P. C. 9: 809
Smart, P. L. 3: 200
Smart, P. L. 8: 802
Smathers, N. P. 9: 828
Smith, David Lee 8: 712
Smith, Graham N. 7: 634
Smith, Norman D. 1: 10
Smith, Paul K. 3: 238
Smoot, N. Christian 9: 912
Snee, L. W. 10: 1031
Snow, J. Kent 3: 223
Snyder, David B. 6: 528
Snyder, Stephen W. 12: 1227
Solomon, M. 7: 630
Spangler, Robert R. 1: 72
Spear, Frank S. 2: 184
Spieler, A. 9: 828
Squires, Richard L. 12: 1182
Stanistreet, I. G. 1: 67
Staub, Margaret W. 2: 120
Stemper, Becky A. 9: 858
Stephenson, R. A. 7: 603
Stern, Robert J. 11: 1103
Stern, T. A. 10: 979
Steyrer, H. P. 12: 1207
Stijfhoorn, D. E. 9: 809
Stingl, Volkmar 11: 1095
Stockmal, Glen S. 8: 765
Stoeser, Douglas B. 1: 35
Stoffa, Paul L. 10: 1023
Stone, David B. 1: 40
Storey, B. C. 6: 497
Strasser, A. 9: 816
Strayer, Luther M., IV 10: 1031
Strecker, M. R. 4: 299
Stueber, Alan M. 4: 315
Sullivan, Morgan D. 12: 1215
Sultan, Mohamed 8: 761
Sultan, Mohamed 11: 1103
Sultze, Kimberly 7: 642
Sutcliffe, R. H. 11: 1086
Sutherland, Patrick K. 9: 906
Sutter, M. 7: 587
Swainbank, Ian 10: 1028
Swapp, Susan M. 6: 563
Swart, Peter K. 5: 387
Swift, B. Ann 2: 149
Swift, M. G. 1: 75
Symons, D. T. A. 3: 234
Tabacco, I. 7: 587
Taghon, G. L. 6: 493
Tanaka, Kenneth L. 9: 902
Tarduno, John A. 8: 683
Tardy, M. 7: 587
Teeter, James W. 3: 220
Tegtmeyer, K. J. 1: 5
Terry, Michael P. 8: 786
Thewissen, J. G. M. 2: 185
Thompson, J. B. 10: 995
Thouvenot, F. 7: 587
Tiffney, Bruce H. 4: 311
Tirsgaard, Henrik 11: 1142
Todd, Clifford S. 1: 83
Touchard, Gerard 11: 1126
Tozer, E. T. 6: 575
Trexler, James H., Jr. 5: 422
Triplehorn, D. M. 1: 92
Trudu, Alfonso G. 2: 188
Tuccillo, M. E. 9: 839
Tucholke, Brian E. 9: 911
Tull, James F. 11: 1046
Turrin, Brent D. 12: 1248
U. S., Federal/State Gorda Ridge Technical Task Force Working Group B 6: 493
Ulrich, M. R. 8: 716
Umhoefer, Paul J. 8: 800
Underwood, Michael B. 1: 54
Unrug, Raphael 11: 1041
Unrug, Sophia 11: 1041
Vahrenkamp, Volker C. 5: 387
van der Pluijm, Ben A. 9: 839
van der Pluijm, Ben A. 9: 898
van der Pluijm, Ben A. 11: 1115
van der Pluijm, Ben A. 12: 1195
Van der Voo, Rob 4: 291
Van der Voo, Rob 9: 898
Van Schmus, W. R. 1: 14
van Staal, Cees R. 11: 1073
Vandervoort, Dirk S. 6: 567
Venzke, Edward A. 7: 642
Verner, Denis 11: 1078
Verpaelst, P. 11: 1086
Villasuso, Miguel 8: 803
Villien, A. 7: 587
Von Damm, K. L. 2: 190
Vrolijk, Peter 8: 703
Vyhnal, Christopher R. 10: 938
Waldron, John W. F. 8: 765
Walker, J. Douglas 6: 554
Wallace, Malcolm W. 2: 132
Wallace, Wesley K. 5: 395
Wallensky, Eugene 1: 62
Wallin, E. T. 11: 1057
Wallis, S. R. 7: 675
Wallmann, Peter C. 12: 1240
Walter, Lynn M. 4: 315
Waltham, Dave 1: 26
Wang, G. R. 2: 128
Ward, Lauck W. 4: 311
Warner, Michael R. 6: 528
Wells, Lisa E. 11: 1134
Wells, Michael L. 10: 929
Wells, S. G. 6: 549
Wernicke, Brian 6: 520
Wernicke, Brian P. 3: 223
West, G. F. 11: 1086
West, Gordon F. 6: 513
Westaway, Rob 9: 915
Westgate, John A. 9: 858
Whalen, Joseph B. 5: 411
Wheatcroft, Robert A. 9: 843
Whitaker, F. F. 3: 200
Whitaker, F. F. 8: 802
White, Nicky 4: 327
White, Perry B. 9: 906
White, Robert S. 5: 462
Whittingham, Andrew M. 11: 1119
Wilber, R. Jude 10: 970
Williams, Paul F. 3: 238
Williamson, P. E. 1: 75
Wilson, Paula N. 9: 866
Wiltshire, J. C. 6: 493
Winchester, John A. 11: 1073
Windley, B. F. 2: 128
Wing, Scott L. 4: 311
Wobus, Reinhard A. 7: 642
Wojcik, Krzysztof M. 3: 251
Wolfe, Jack A. 4: 311
Wooden, Joseph L. 12: 1219
Woodroffe, Colin 1: 62
Woods, Arnold 9: 910
Woodward, Lee A. 2: 179
Wright, T. O. 7: 654
Wyman, Derek 9: 882
Young, R. 12: 1178
Zaikowski, Anthony 1: 72
Zayac, Wendy C. 11: 1122
Zeitler, Peter K. 7: 626
Zhang, C. 2: 128
Zhao, Z. Y. 2: 128
Zheng, Y. F. 7: 671
Zientek, M. L. 11: 1065
Zietz, Isidore 4: 332